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Dipesh Navsaria,
MPH, MSLIS, MD

www.navsaria.com
facebook.com/DrLibrarian
[@navsaria](https://twitter.com/navsaria)

BOOKS BUILD BETTER BRAINS

HOW PROMOTING LITERACY IS KEY TO
EARLY BRAIN AND CHILD DEVELOPMENT

DIPESH NAVSARIA, MPH, MSLIS, MD



DEPARTMENT OF PEDIATRICS
UW SCHOOL OF MEDICINE & PUBLIC HEALTH

SCHOOL OF LIBRARY AND INFORMATION STUDIES
UNIVERSITY OF WISCONSIN-MADISON

MEDICAL DIRECTOR, REACH OUT AND READ WISCONSIN



Disclosure

**I have no relevant financial relationships
to disclose.**

**I will not discuss off-label use or
investigational use in my presentation.**

Although...



I don't know if “mouthing” is an FDA-approved use of board books.

“Oh, that’s so nice...”
CRITICAL

A stroll through the Early Brain

Reading Reality

Reach Out and Read

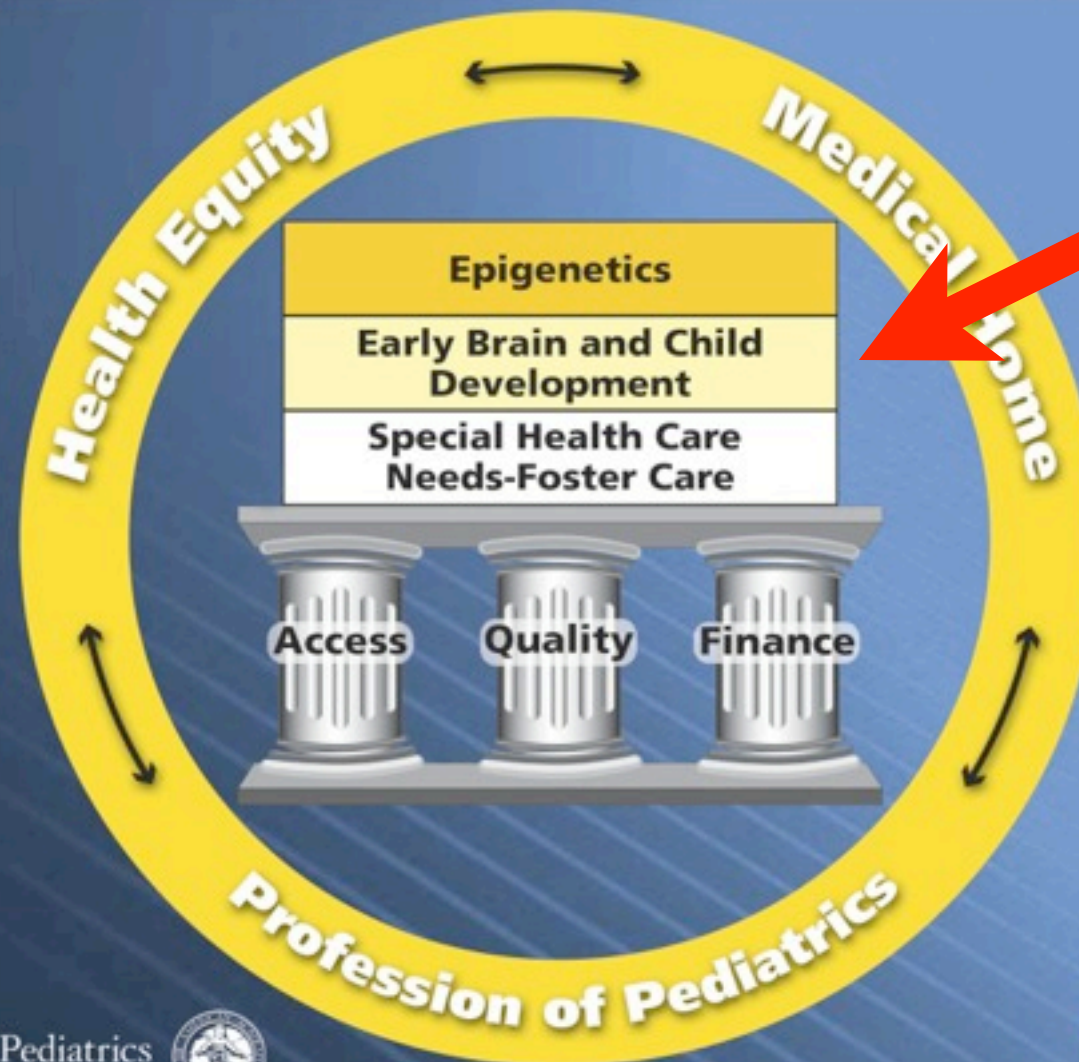
First, a story...

Part One

A Stroll Through the Early Brain

AAP Agenda for Children 2011-2012

DEDICATED TO THE HEALTH OF ALL CHILDREN™



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■ Planning
■ Implementing
■ Integrating

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■ Integrating
■ Implementing
■ Planning



EARLY BRAIN AND CHILD DEVELOPMENT

from *The Science of Early Childhood Development*
National Scientific Council on the Developing Child, 2007

mind is its own place
of Hell; a
John Milton: "Para

EARLY BRAIN AND CHILD DEVELOPMENT

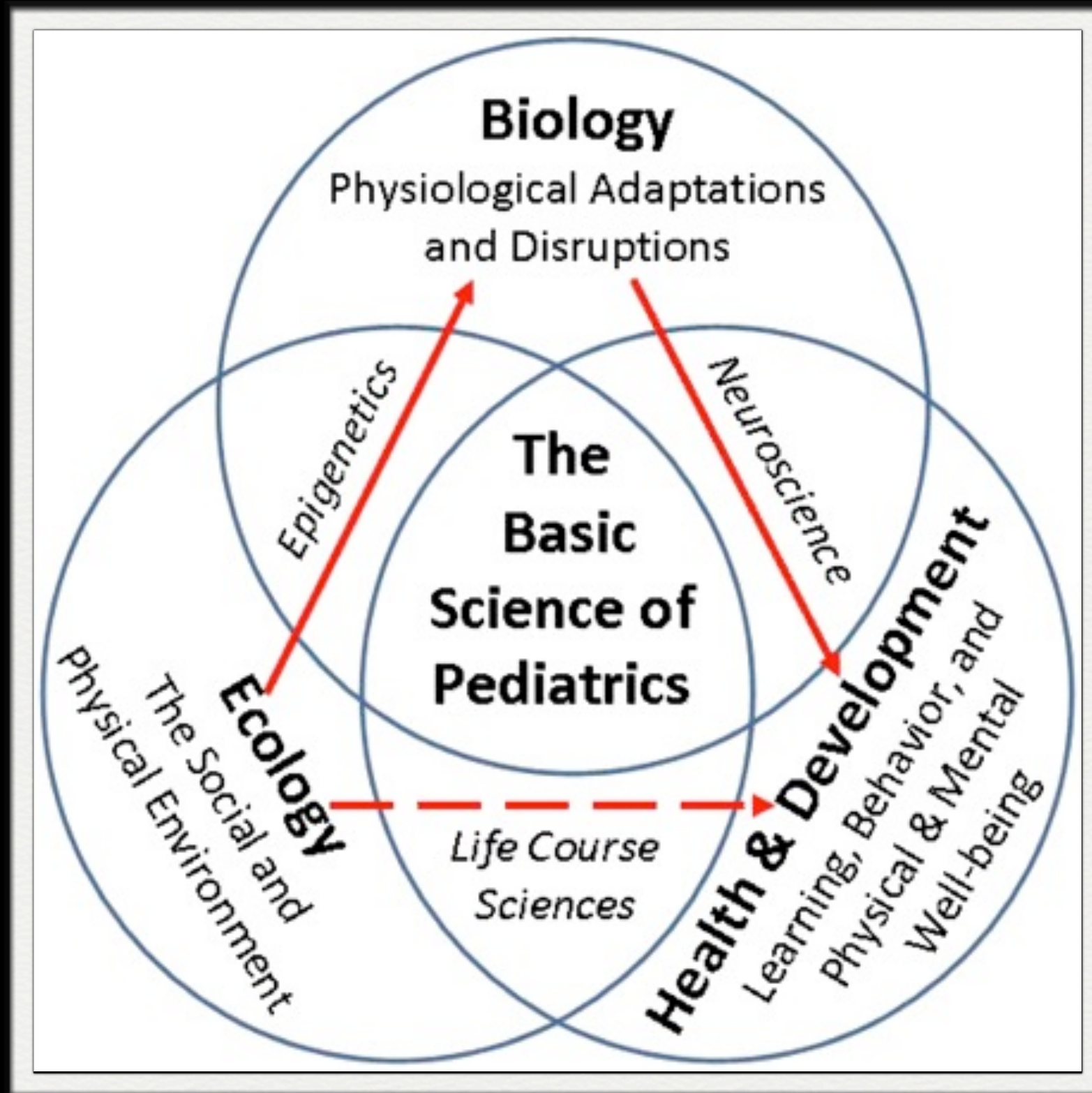
1

Child development is a foundation for **community** development and **economic** development, as capable children become the foundation of a prosperous and sustainable society.

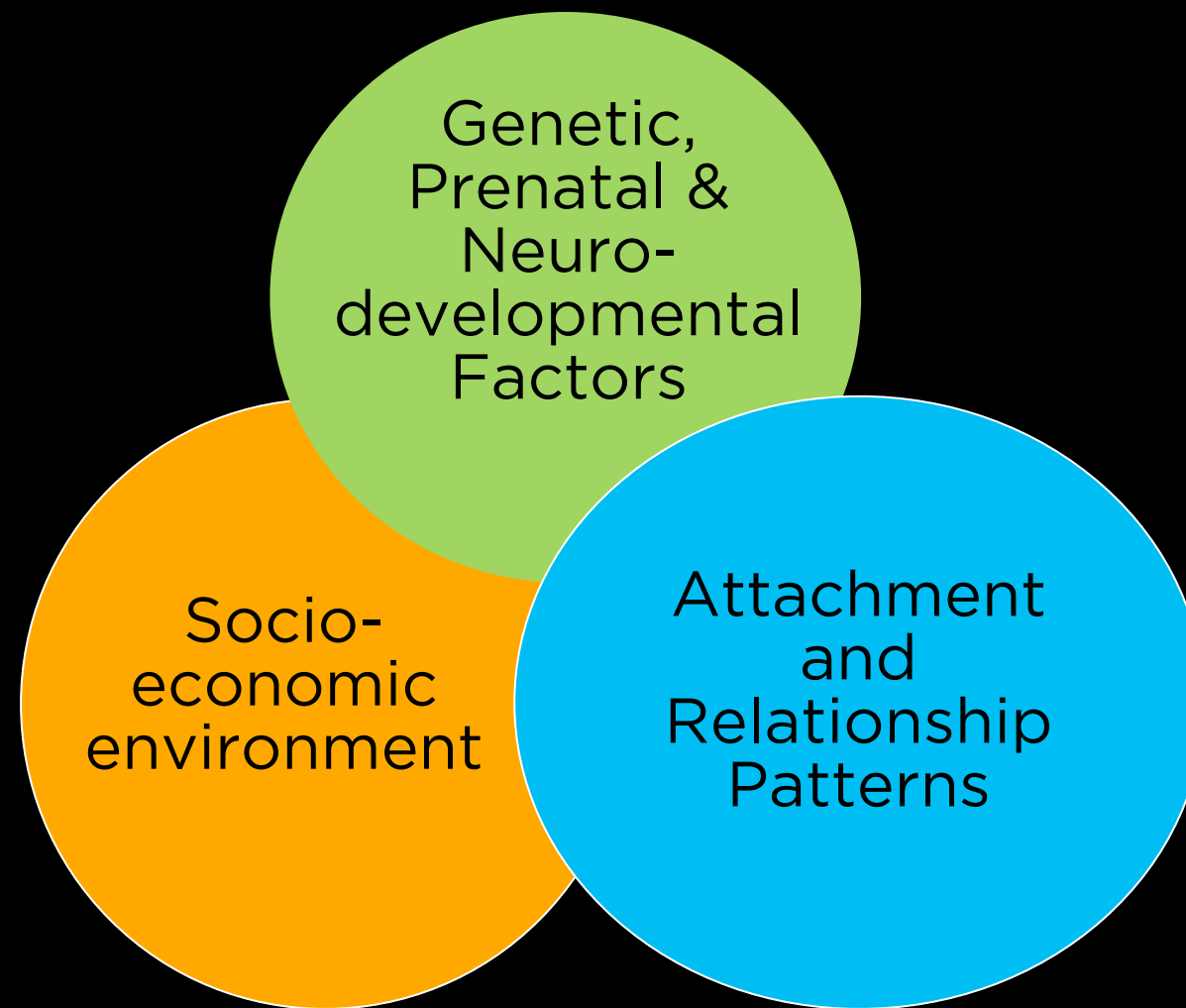
2

Brains are built **over time**.

Eco-biodevelopmental Model



The **3-legged stool** for developmental and health trajectories



EARLY BRAIN AND CHILD DEVELOPMENT

3

The interactive influences of genes and experience literally **shape** the architecture of the developing brain and the active ingredient is the “**serve and return**” nature of children’s engagement in relationships with their parents and other caregivers in their family or community.

The Face to Face Paradigm

Edward Z Tronick



EARLY BRAIN AND CHILD DEVELOPMENT

4

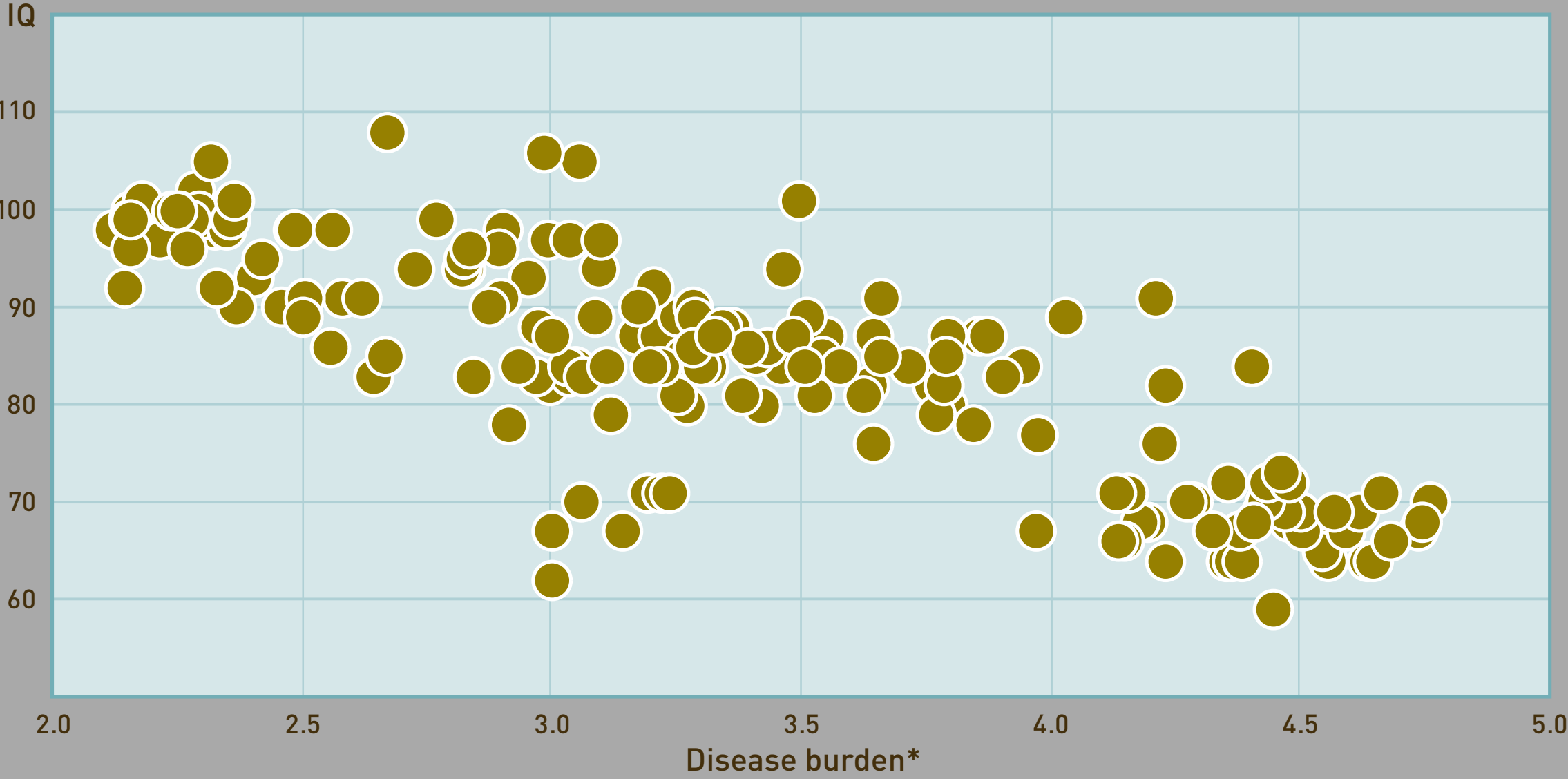
Both brain architecture and developing abilities are built “from the bottom up” with simple circuits and skills providing the **scaffolding** for more advanced circuits and skills over time.

EARLY BRAIN AND CHILD DEVELOPMENT

5

Toxic stress in early childhood is associated with **persistent** effects on the nervous system and stress hormone systems that can **damage developing brain architecture** and lead to lifelong problems in learning, behavior and both physical and mental health.

Correlation between IQ and disease burden in 184 selected countries



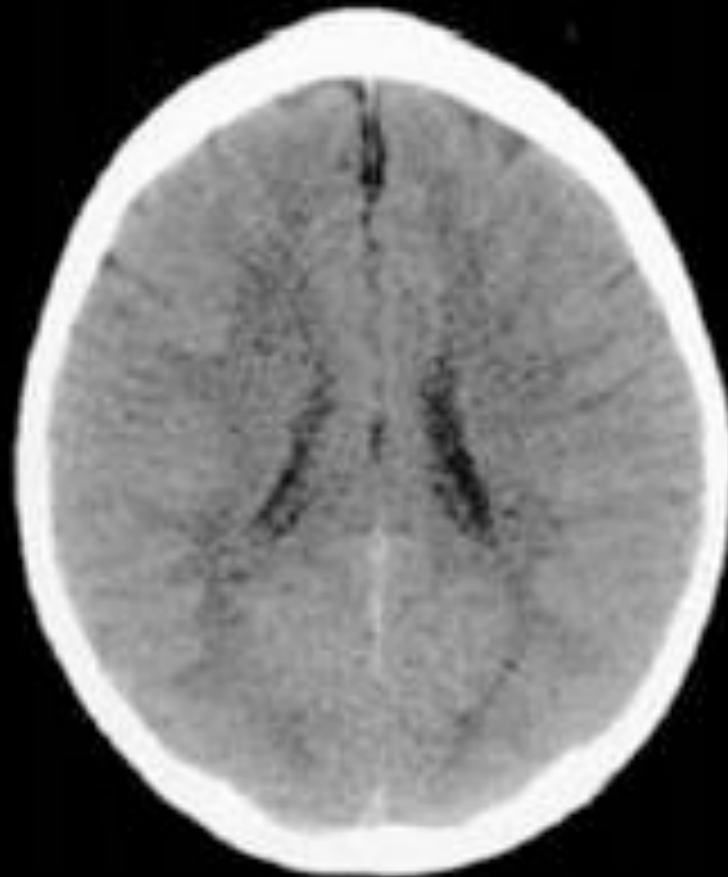
**The logarithm of disability-adjusted life years (DALYs) lost to 28 representative and important human infectious diseases.*

Source: Christopher Eppig,
University of New Mexico

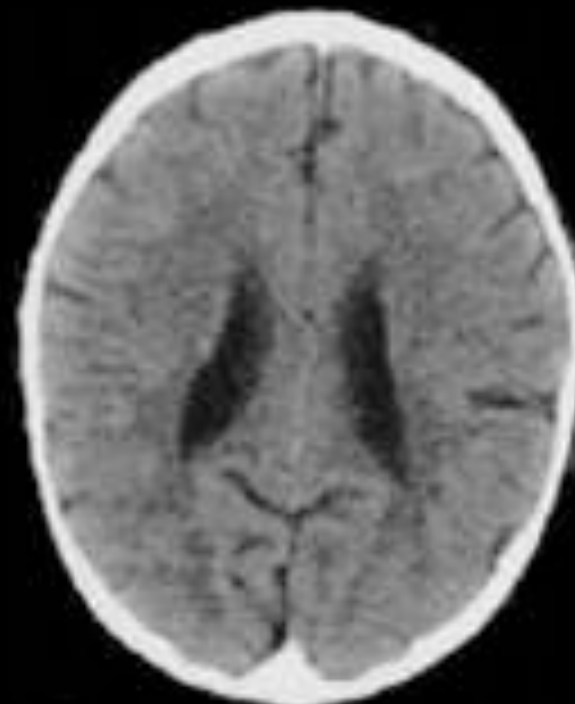
**The logarithm of disability-adjusted life years (DALYs) lost to 28 representative and important human infectious diseases.*

UNIVERSITY OF NEW MEXICO
SOURCE: CHRISTOPHER EPPIG

3 Year Old Children



Normal



Extreme Neglect

THE STRESS RESPONSE:

increases in cortisol and epinephrine

Three Levels of Stress Response

Positive

Brief increases in heart rate,
mild elevations in stress hormone levels.

Tolerable

Serious, temporary stress responses,
buffered by supportive relationships.

Toxic

Prolonged activation of stress response systems
in the absence of protective relationships.

Source: Center on the Developing Child at Harvard University

Social-emotional buffering
is the **primary factor**
distinguishing level of stress.

Andy Garner, MD

Adversity & Toxic Stress

Toxic stress is the
key intergenerational transmitter
of social and health disparities

POSITIVE STRESS

Child sees someone approaching
with their immunization syringe

Parent leaving on the first day of preschool

TOLERABLE STRESS

Death of a family member

Serious illness

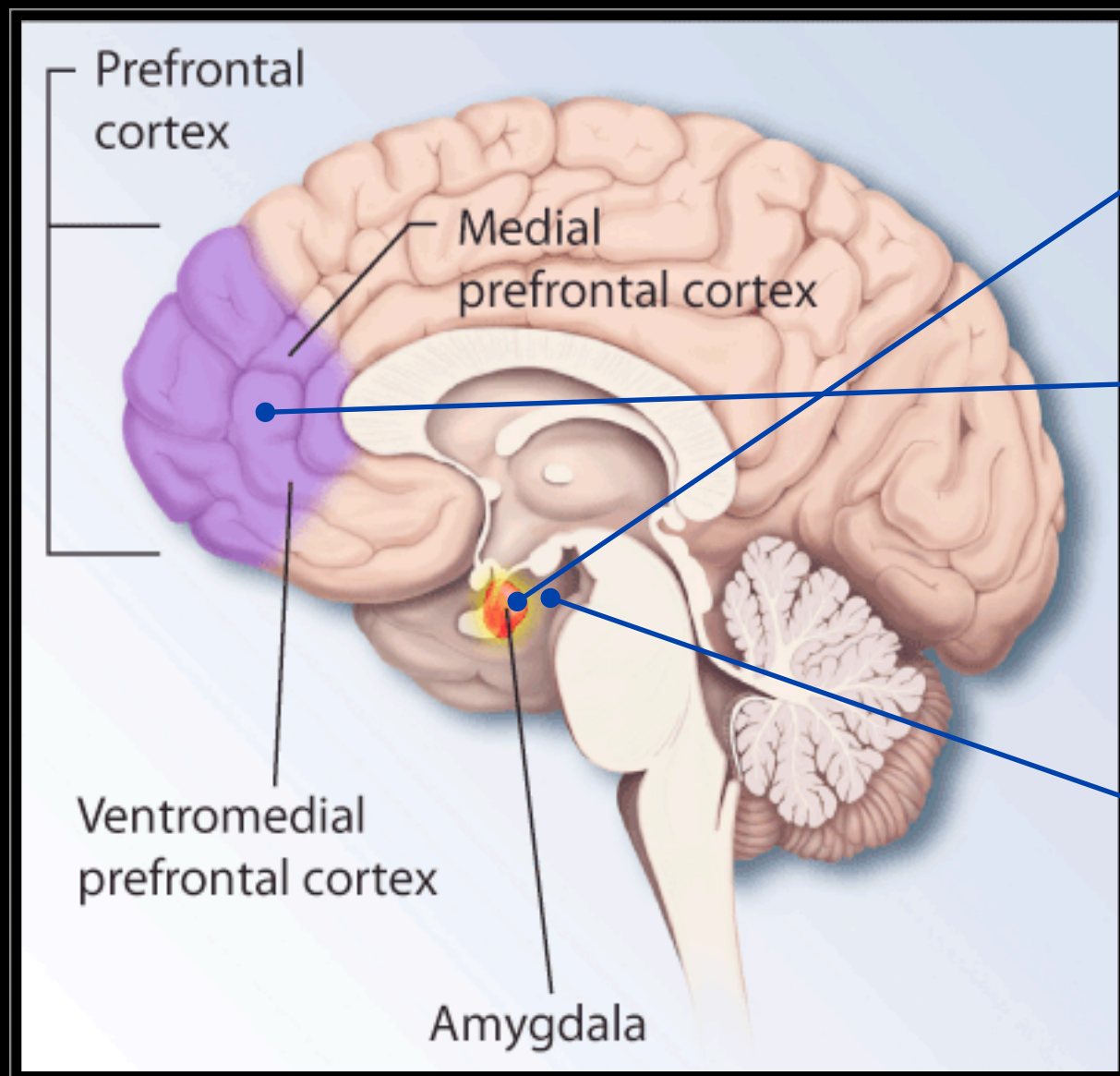
Natural disaster

What if it's worse?
What if there's no supportive relationships?

Child abuse
Parental substance abuse
Homelessness

TOXIC STRESS

What happens?



Amygdala:

activates the stress response

Toxic stress: enlargement

Prefrontal cortex:

usually a check to the amygdala

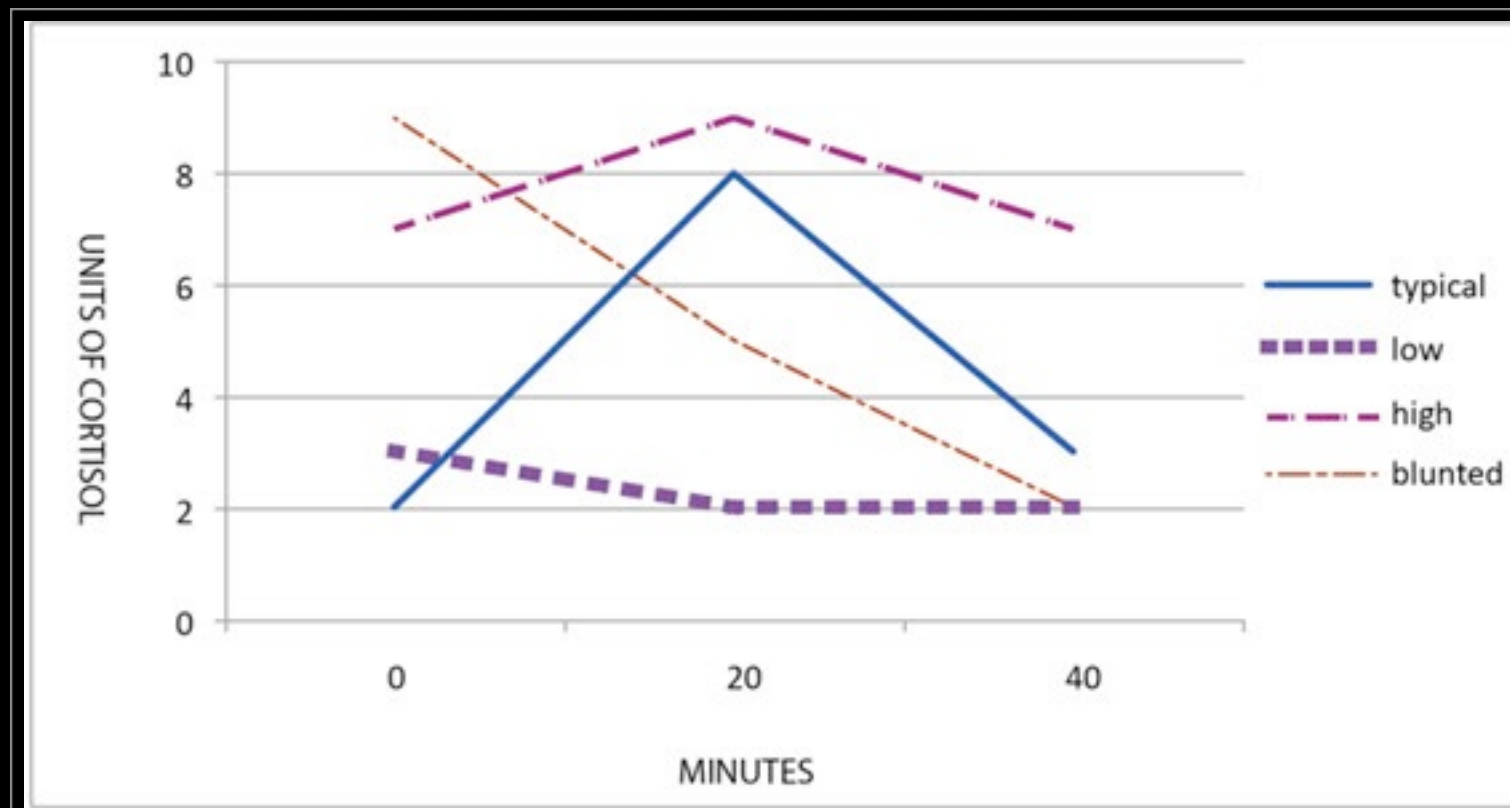
Toxic stress: loss of neurons, less able to function

Hippocampus:

major role in memory and mood

Toxic stress: impairment in understanding and emotion

POVERTY IS NEUROTOXIC



Children with “typical” cortisol response had **higher** executive function, and were rated as having **more** self-control in the classroom.

Those with a flat (high or low) or blunted response had **low** levels of executive function and were rated as having **poor** self-regulation.

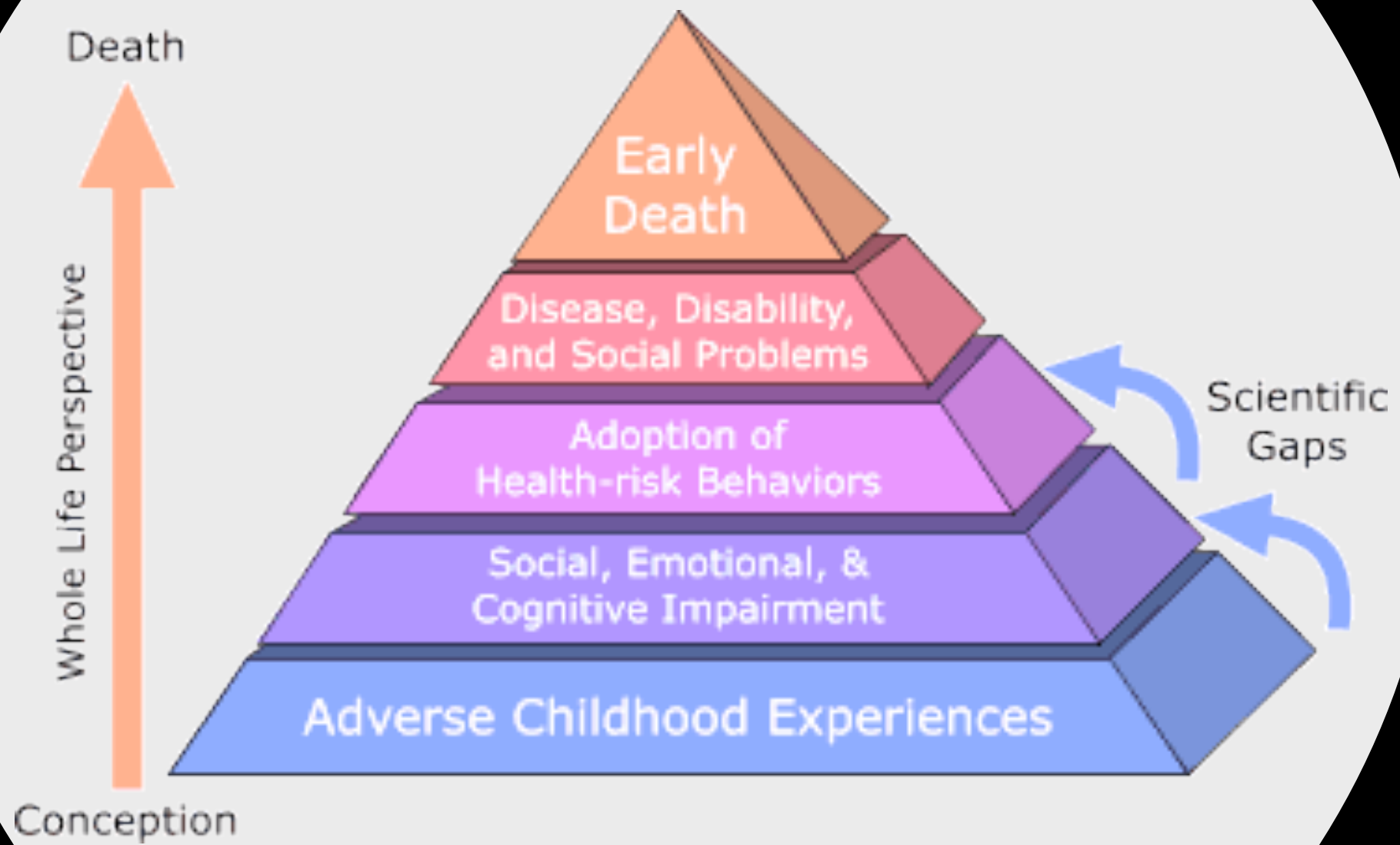
POVERTY IS NEUROTOXIC

Next, children in a large (1200) study whose mothers engaged in “scaffolding” during play had lower cortisol levels and were more attentive.

Those who were more authoritative had higher cortisol levels and were found to be less attentive.

This was found at 7 months of age and again at 15 months.

They also found that the more impoverished the family, the less likely they were to engage in scaffolding.



THE ADVERSE CHILDHOOD EXPERIENCES STUDY

The Most Important Study
You've (Probably) Never Heard Of.

In 1985, Dr Vincent Felitti noticed many patients in his obesity treatment programs had prior history of abuse or trauma

The CDC worked with Kaiser Permanente and looked retrospectively at over 17,000 patients.

This was the first study to simultaneously assess childhood exposure to multiple types of abuse, neglect, domestic violence and serious household dysfunction.

THE ADVERSE CHILDHOOD EXPERIENCES STUDY

Study participants were middle-class Americans from San Diego, 80% white, 74% attended college, average age of 57, split evenly between men and women.

**Not exactly an impoverished,
“at-risk” population.**

THE ADVERSE CHILDHOOD EXPERIENCES STUDY

Emotional Abuse (10%)

Physical Abuse (26%)

Sexual Abuse (21%)

Emotional Neglect (15%)

Physical Neglect (10%)

Mother treated violently (13%)

Household substance abuse (28%)

Household mental illness (20%)

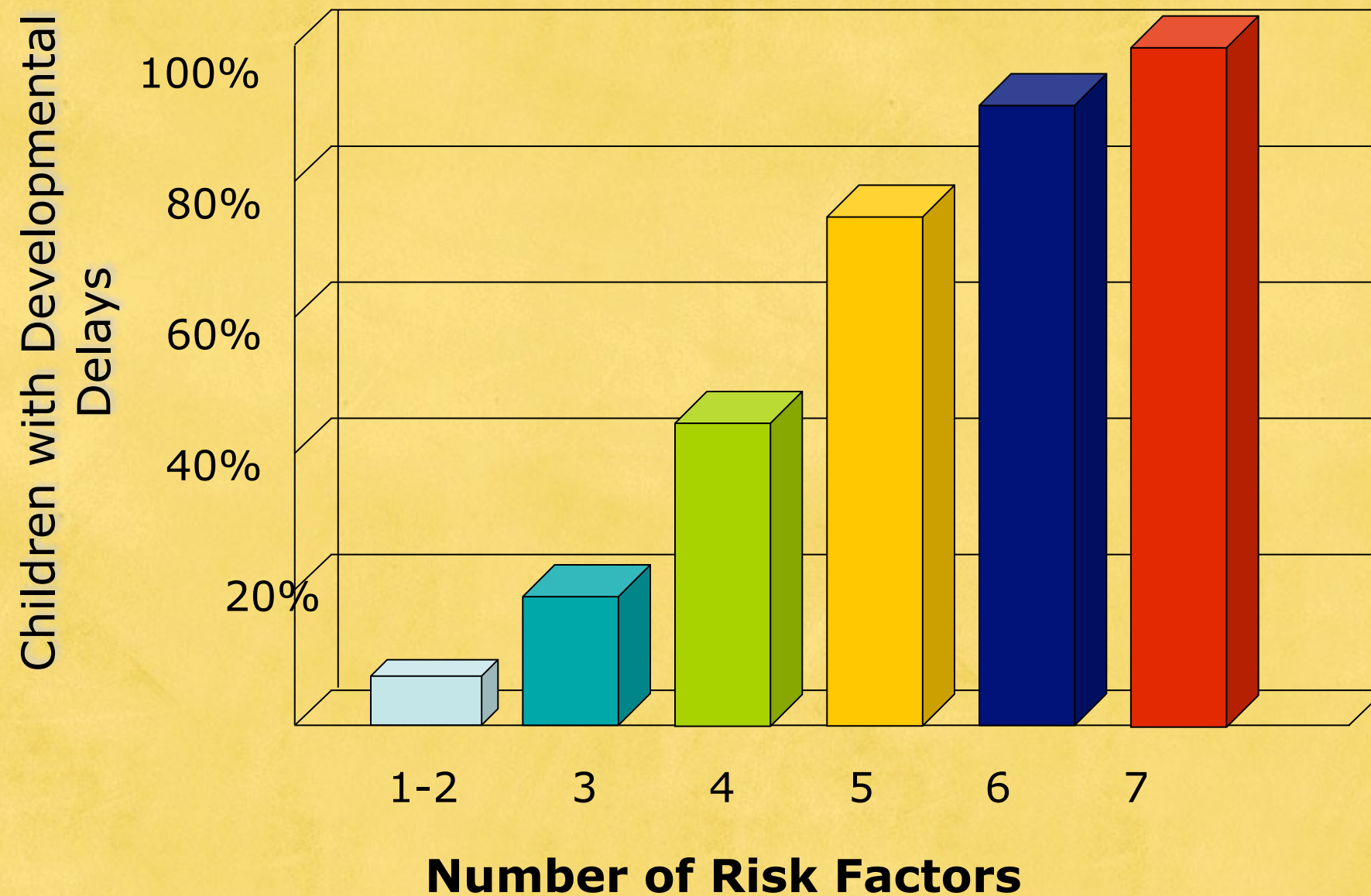
Parental separation or divorce (24%)

Incarcerated household member (6%)

ACE Score (one point for each category listed)	Prevalence in study
0	33%
1	26%
2	16%
3	10%
4	6%
5	5%
6	6%

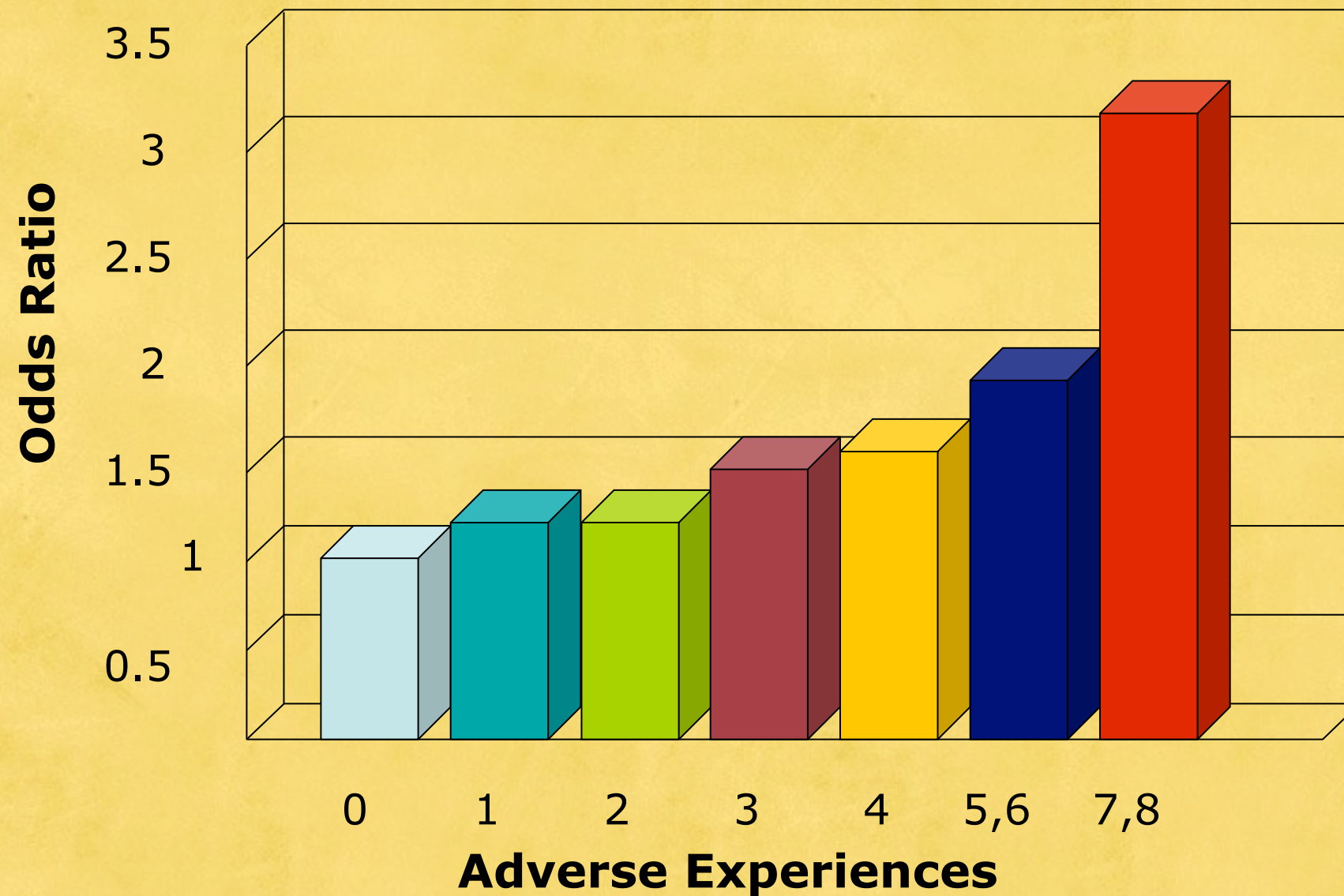
Not only are they unexpectedly common...
...their effects are **cumulative**.

Significant Adversity Impairs Development in the First Three Years



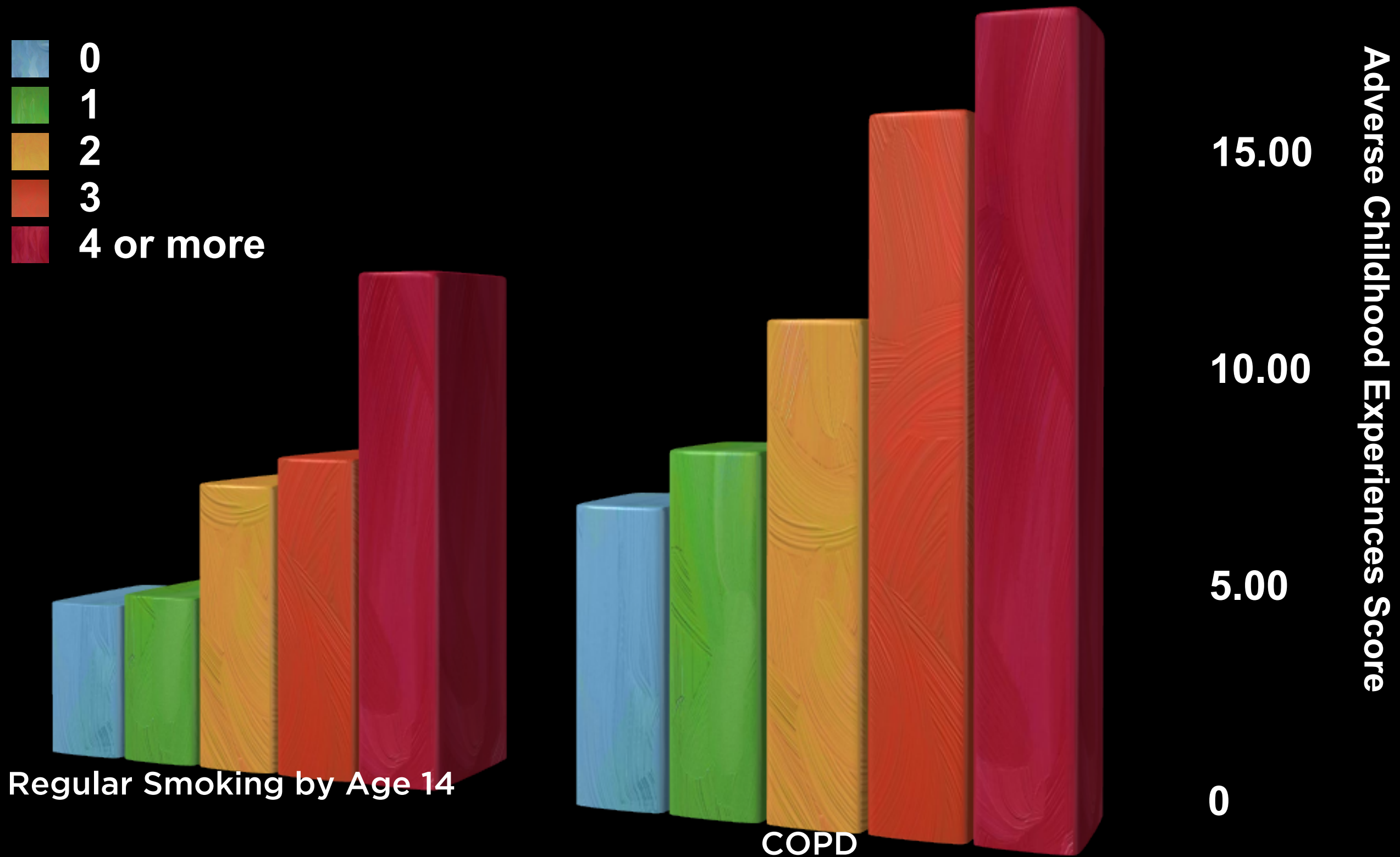
Source: Barth, et al. (2008) *via* Center on the Developing Child at Harvard University

Risk Factors for Adult Heart Disease are Embedded in Adverse Childhood Experiences

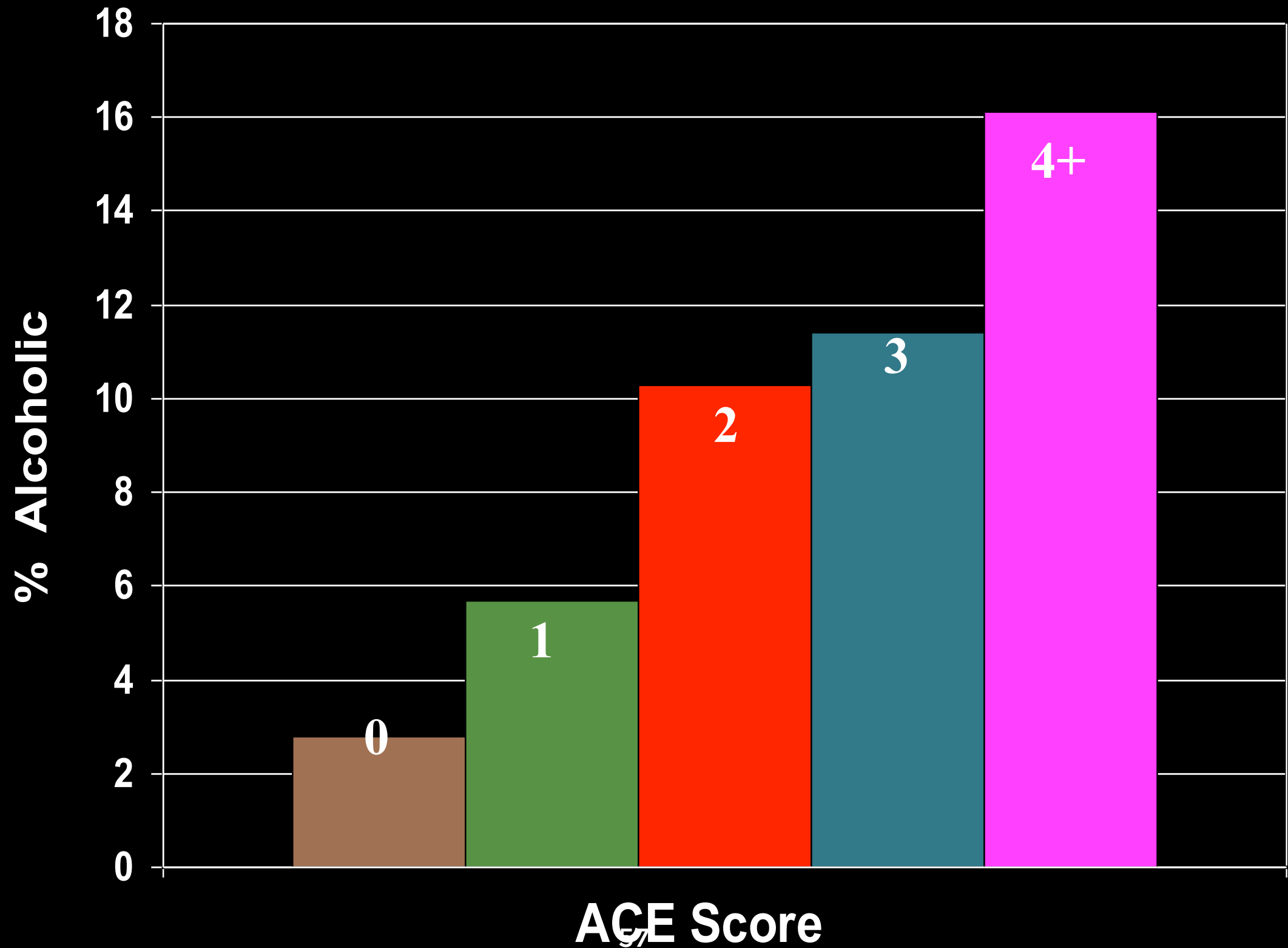


Source: Dong, et al. (2004) *via* Center on the Developing Child at Harvard University

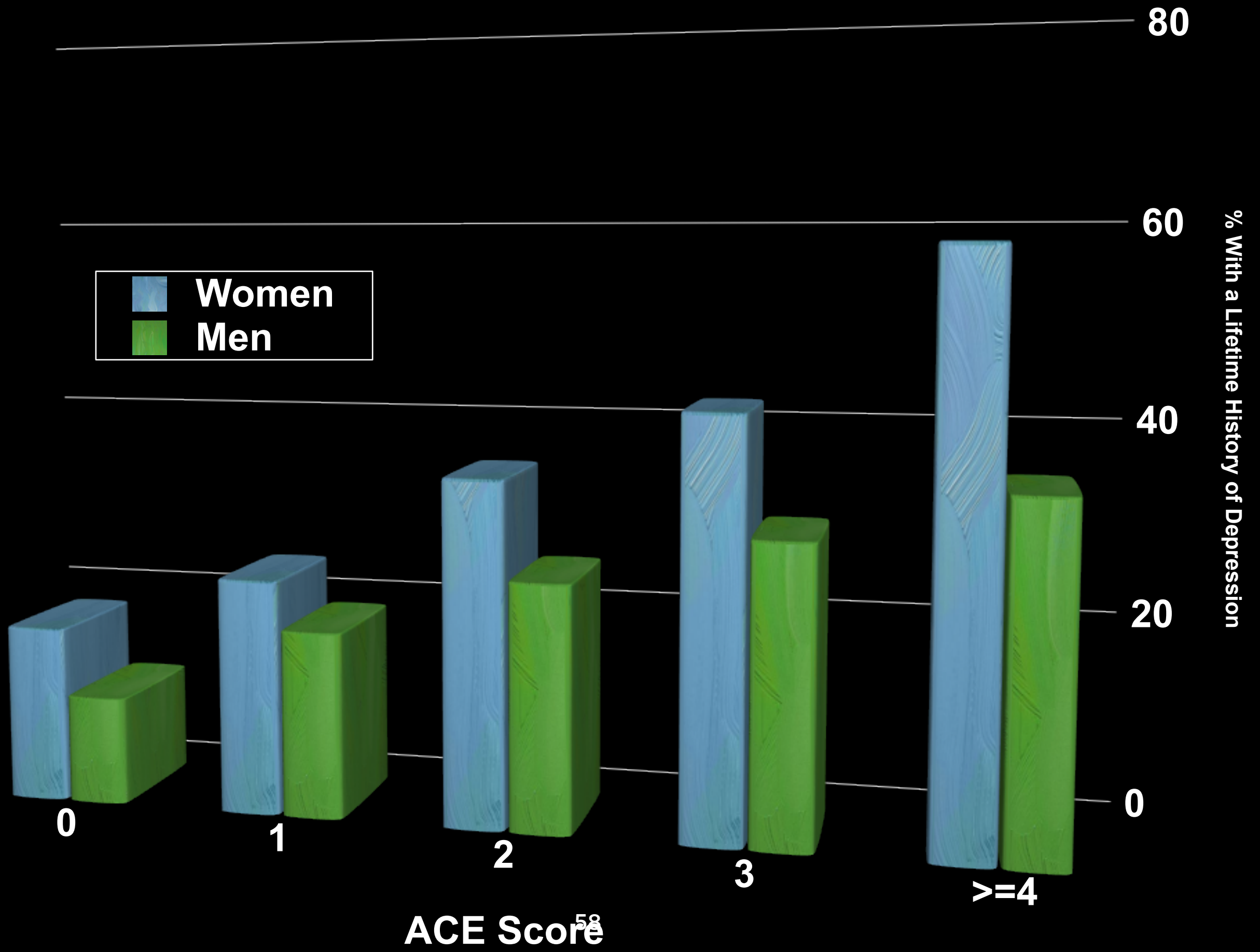
SMOKING & COPD



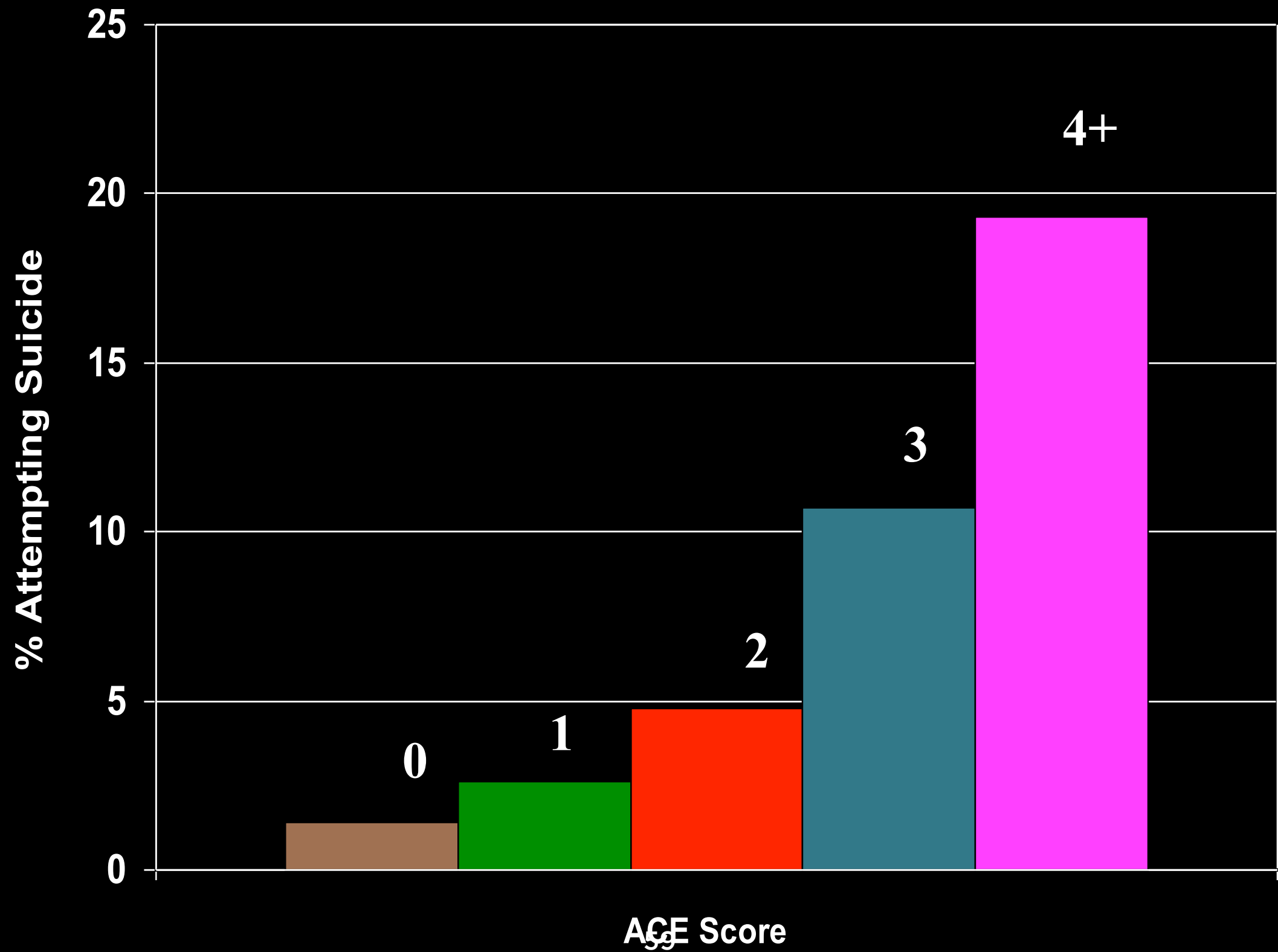
Childhood Experiences vs. Adult Alcoholism



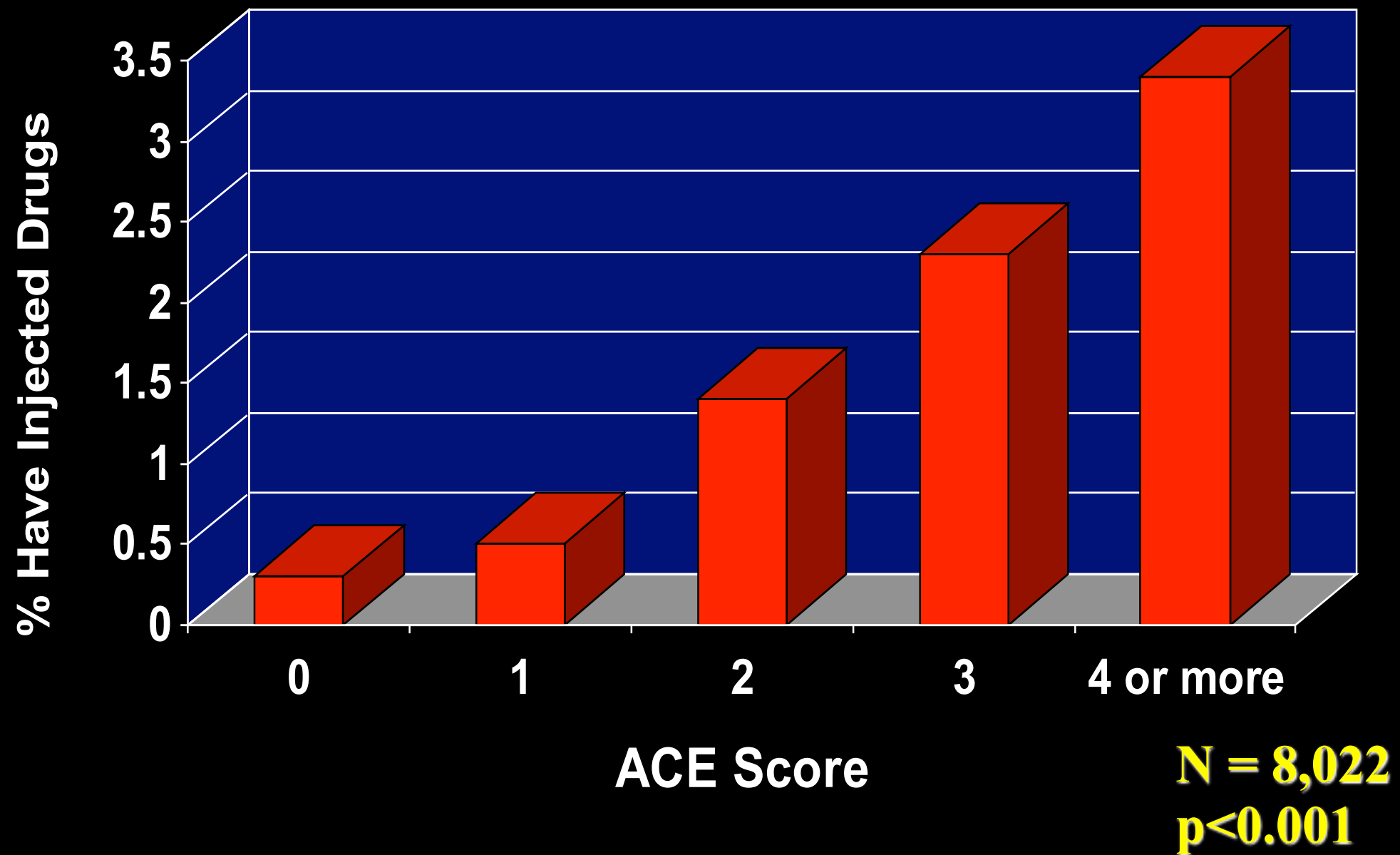
DEPRESSION



SUICIDE



IV DRUG USE



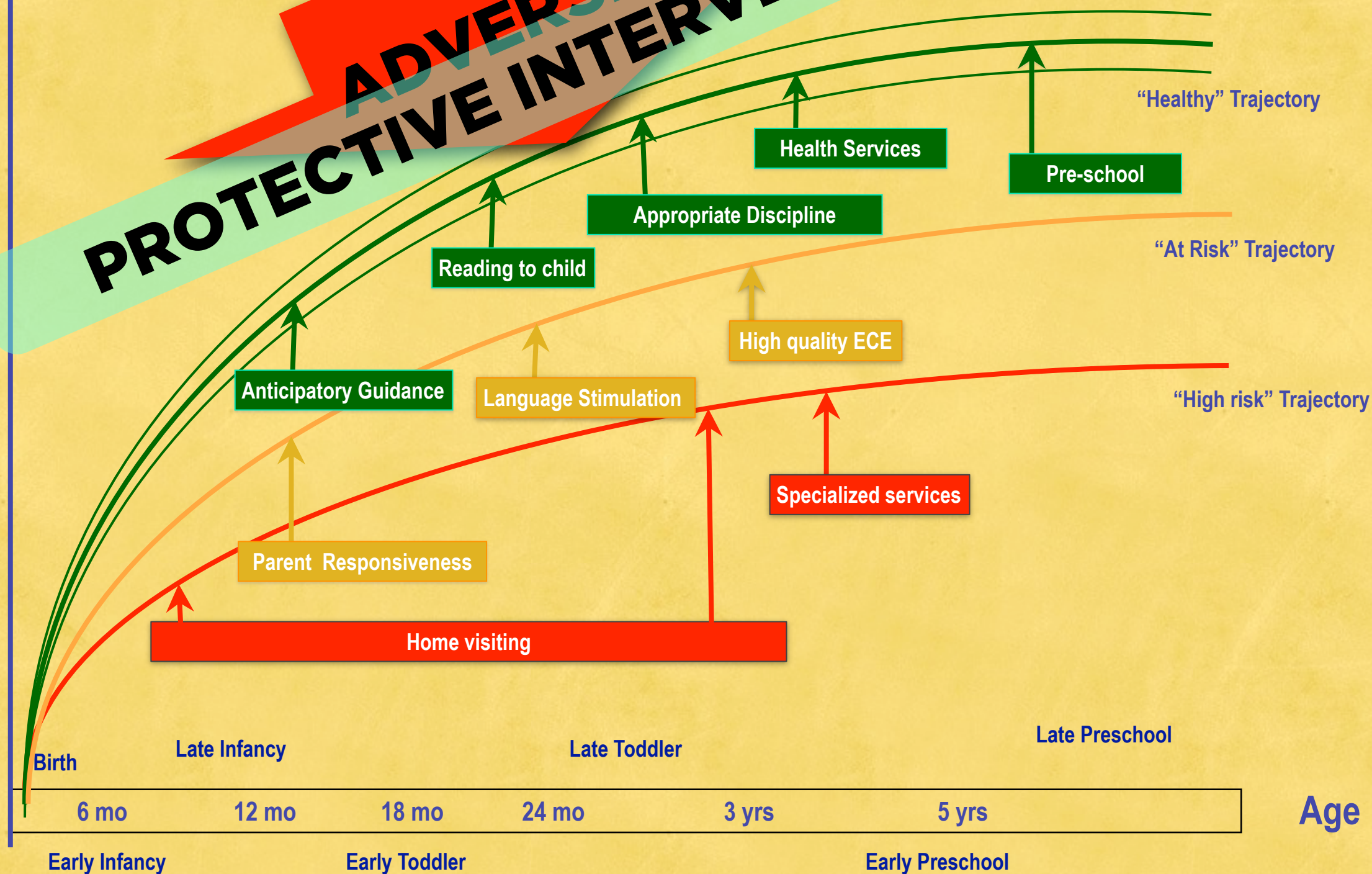
EARLY BRAIN AND CHILD DEVELOPMENT

6

Creating the right conditions for early childhood development is likely to be **more effective and less costly** than addressing problems at a later age.

Developmental Progress

ADVERSITY PROTECTIVE INTERVENTIONS



Three Promising Domains for EB CD Innovation

Jack Shonkoff, MD

Reduce emotional and behavioral barriers to learning.

Enhance the healthy development of children by transforming the lives of their parents.

Reconceptualize the health dimension of early childhood policy and practice.

NONE OF THIS IS TO SAY...

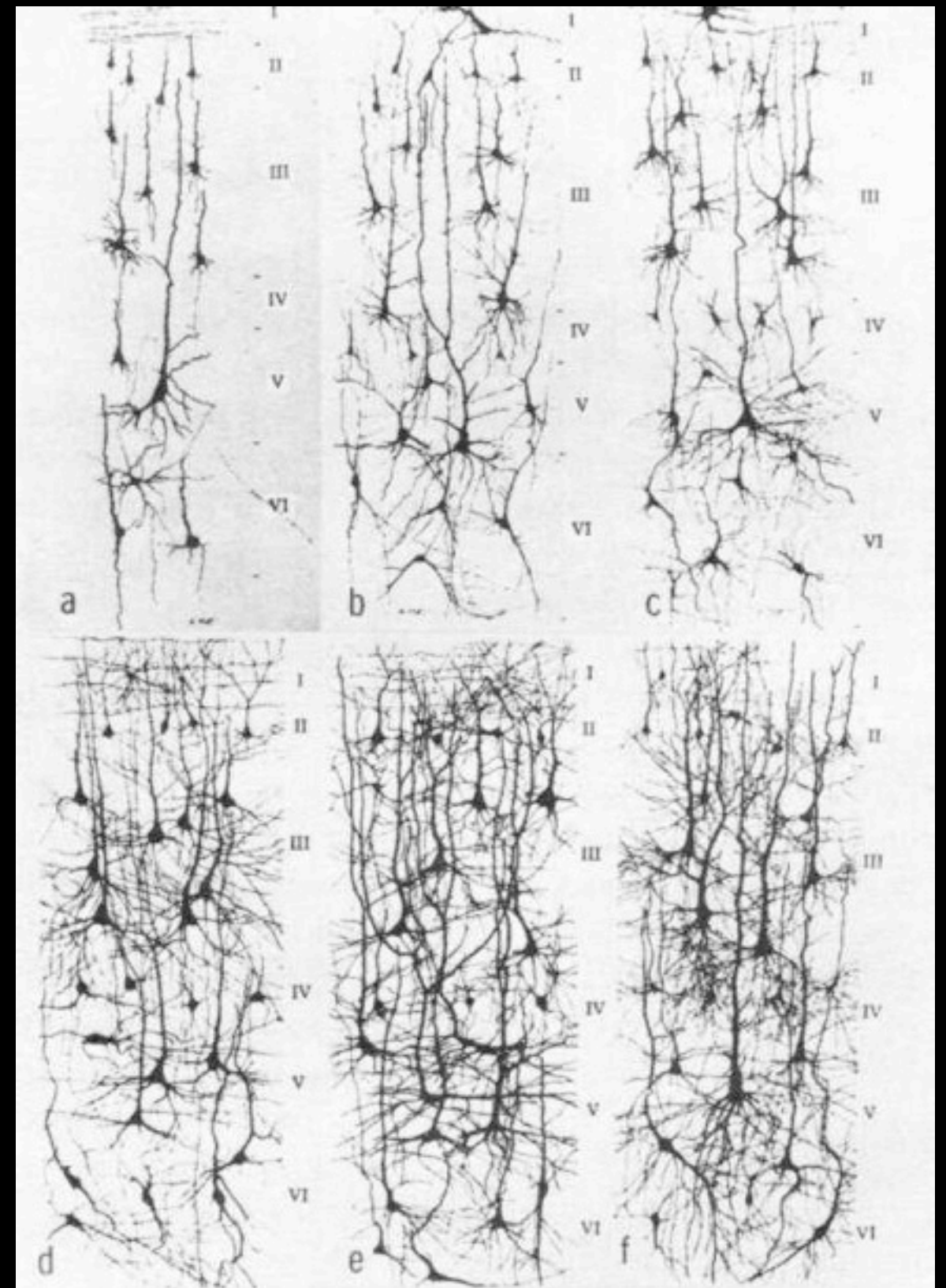
...that children should be engaged constantly

...that “bad things” are necessarily a long-term negative

...that children should not be appropriately disciplined

FIVE NUMBERS TO REMEMBER

700 New Neural Connections per Second



Postnatal development of human cerebral cortex around Broca's Area (FCBm); camera lucida drawings from Golgi-Cox preparations. a: newborn; b: 1 month; c: 3 months; d: 6 months; e: 15 months; f: 24 months.

(from Conel, 1939-1959)

18 Months:

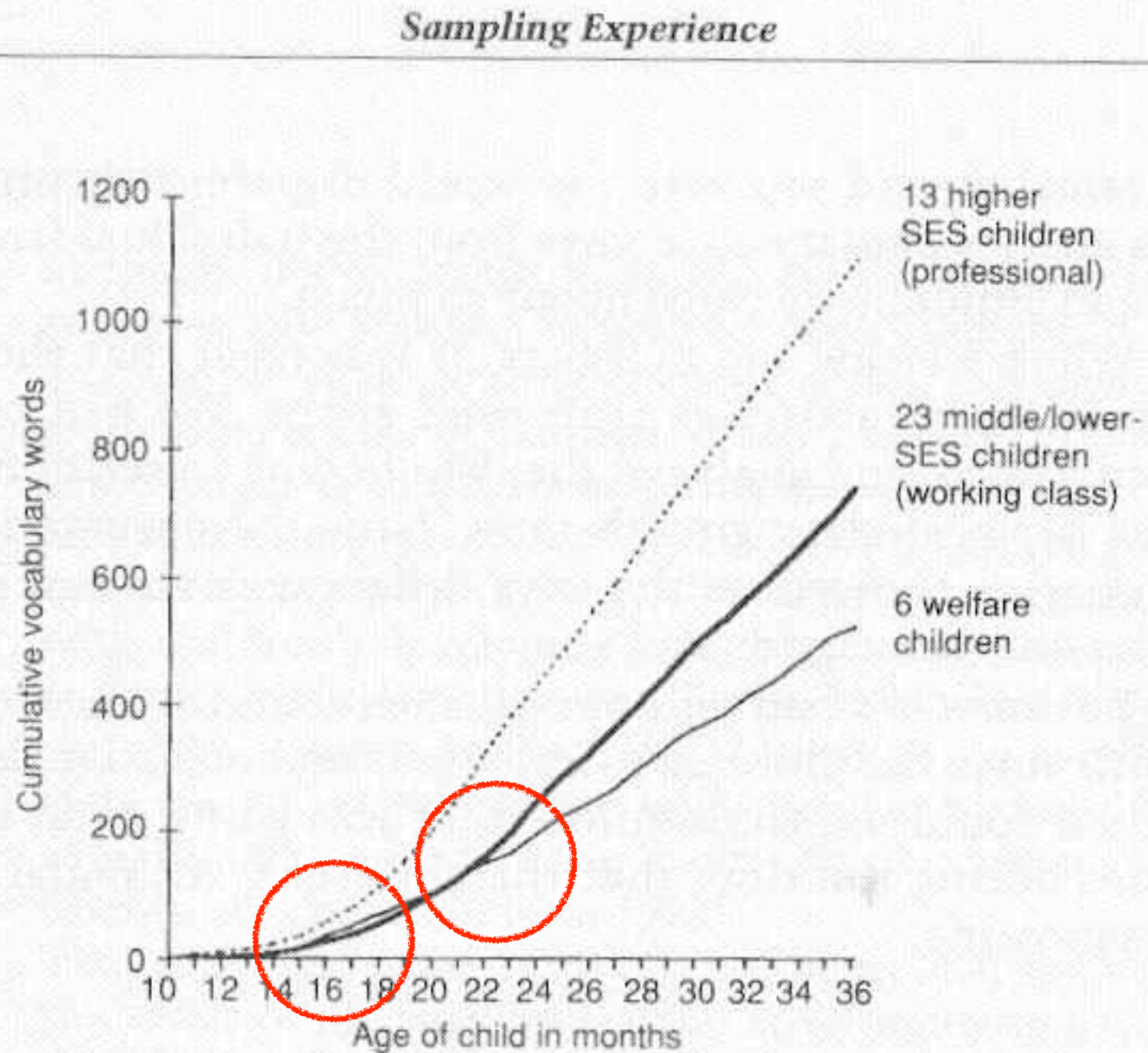


Figure 2. The widening gap we saw in the vocabulary growth of children from professional, working-class, and welfare families across their first 3 years of life. (See Appendix B for a detailed explanation of this figure.)

90-100%

Chance of
Developmental Delays
when Children Experience
6-7 Risk Factors

3:1 Odds

**of Adult Heart Disease
after 7-8 Adverse
Childhood Experiences**

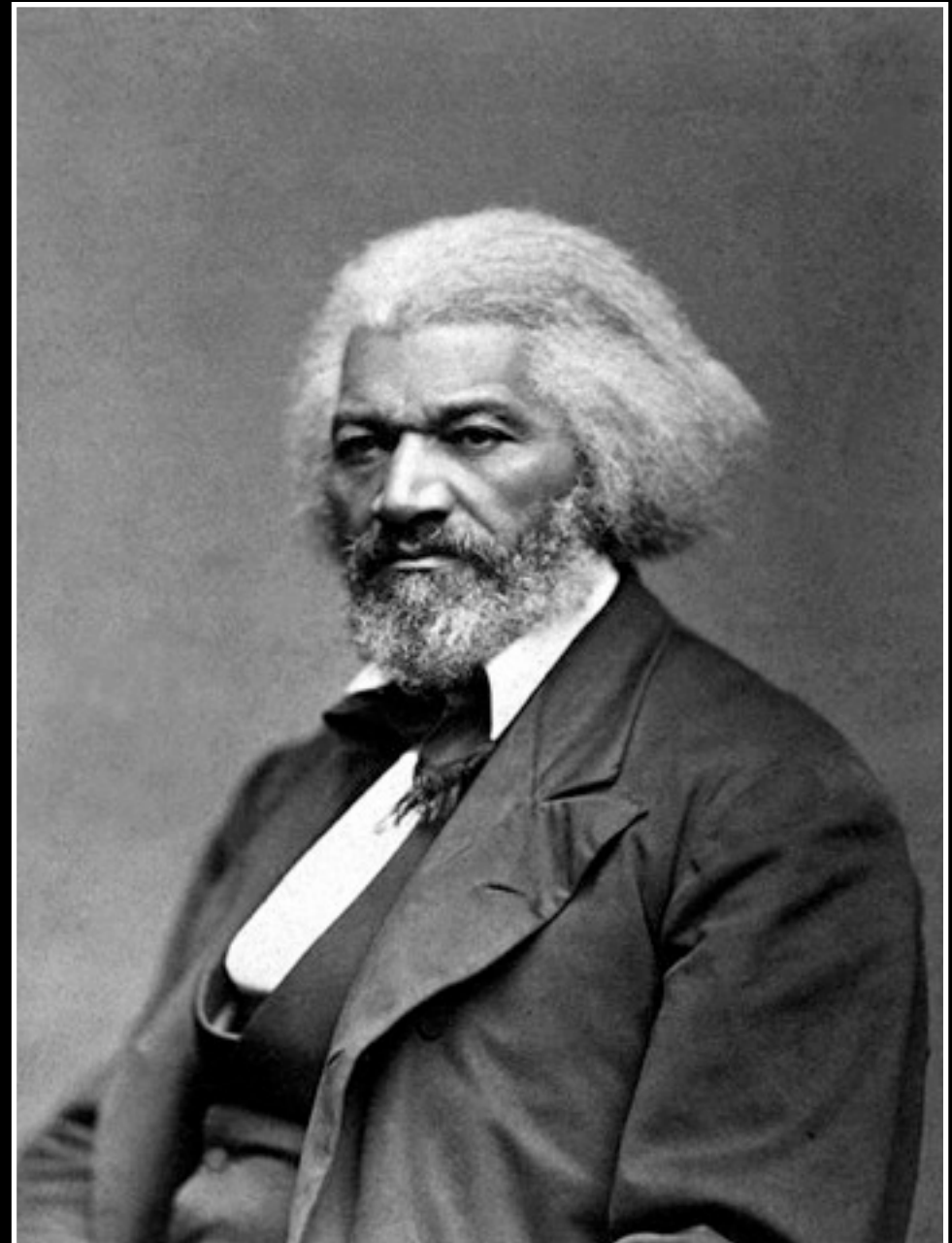
The background of the slide is a dense, overlapping pattern of US dollar bills. The bills are in various denominations, including \$100, \$50, and \$20. The image is darkened to make the text stand out. The text is centered and reads:

\$4-\$9

**in Returns for
Every Dollar Invested
in Early Childhood Programs**

**“It is easier to build
strong children than to
repair broken men.”**

**— Frederick Douglass
(1817–1895)**

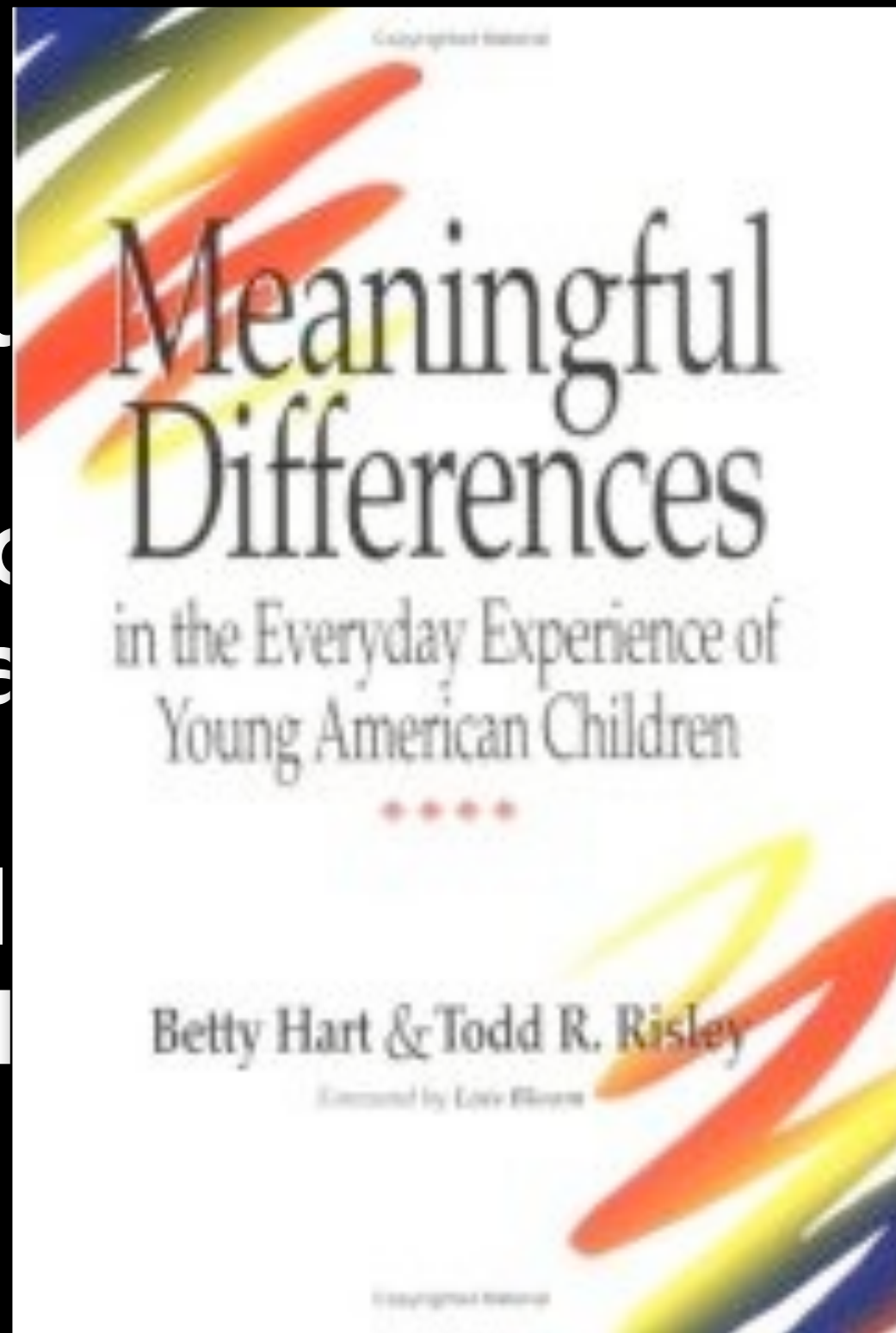


Part Two

Reading Reality

Meaningful in the Experience America

Todd
Betty



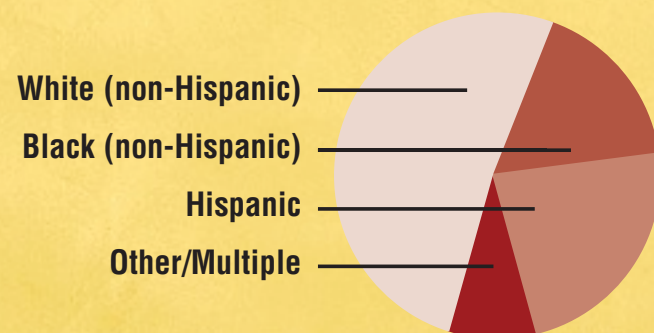
By Age 3...	Welfare	Professionals
Vocabulary Size	525 words	1100 words
IQ	79	117
Utterances	178/hour	487/hour
Encouragements	75,000	500,000
Discouragements	200,000	80,000

Children from low-income families hear as many as **20 million fewer** words than their more affluent peers before the age of 4.

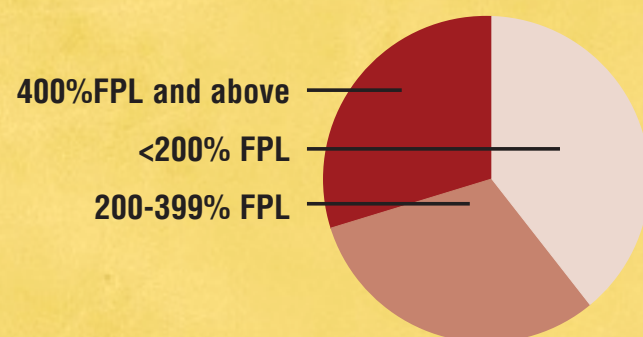


NEW YORK

Racial/Ethnic Distribution among Children Age 0-5 in New York (N~1.5 million)



Income Distribution among Children Age 0-5 in New York (N~1.5 million)



NEW YORK	STATE	NATIONAL	STATE RANKING
Parental Reading			
% Children ages 0-5 read to daily ¹	48.4	47.8	28
<i>% Daily reading by poverty level ¹</i>			
Less than 200% FPL	42.3	40.3	32
200-399% FPL	48.9	50.1	32
400% FPL or greater	58.9	58.9	25
<i>% Daily reading by race/ethnicity ¹</i>			
White (non-Hispanic)	58.1	55.0	17
Non-White	37.8	37.8	32
Black (non-Hispanic)	37.8	38.1	
Hispanic	33.9	33.4	
Other/Multiple Race	/	46.4	
<i>% Daily reading by age ¹</i>			
Children age 0-3 years read to daily	46.9	48.3	32
Children age 4-5 years	50.9	47.0	17
Early Childhood Literacy Resources			
% Children served by ROR ²	19.5	12.8	8
% Children in/near poverty served by ROR ²	41.0	26.0	9
Number of children age 0-5 per public library ³	1,349	1,368	31*
School Performance			
% Students at or above Proficient in reading, Grade 4 ⁴	34	30	17
% Children age 6-17 who have repeated at least one grade ¹	12.3	11.3	36*

Low-income children are at a disadvantage before school begins

A TYPICAL MIDDLE-CLASS 5-YEAR-OLD IS ABLE TO IDENTIFY 22 LETTERS AND SOUNDS OF THE ALPHABET, COMPARED TO JUST 9 LETTERS FOR A CHILD FROM A LOW-INCOME FAMILY.

(WORDEN AND BOETTCHER, 1990; EHRI AND ROBERTS, 2006)

A B C D E F G H I J K L M N O P Q R S T U V ~~W X Y Z~~

MIDDLE-INCOME CHILD'S LETTER RECOGNITION (22 LETTERS)

A B C D E F G H I ~~J K L M N O P Q R S T U V W X Y Z~~

LOW-INCOME CHILD'S LETTER RECOGNITION (9 LETTERS)

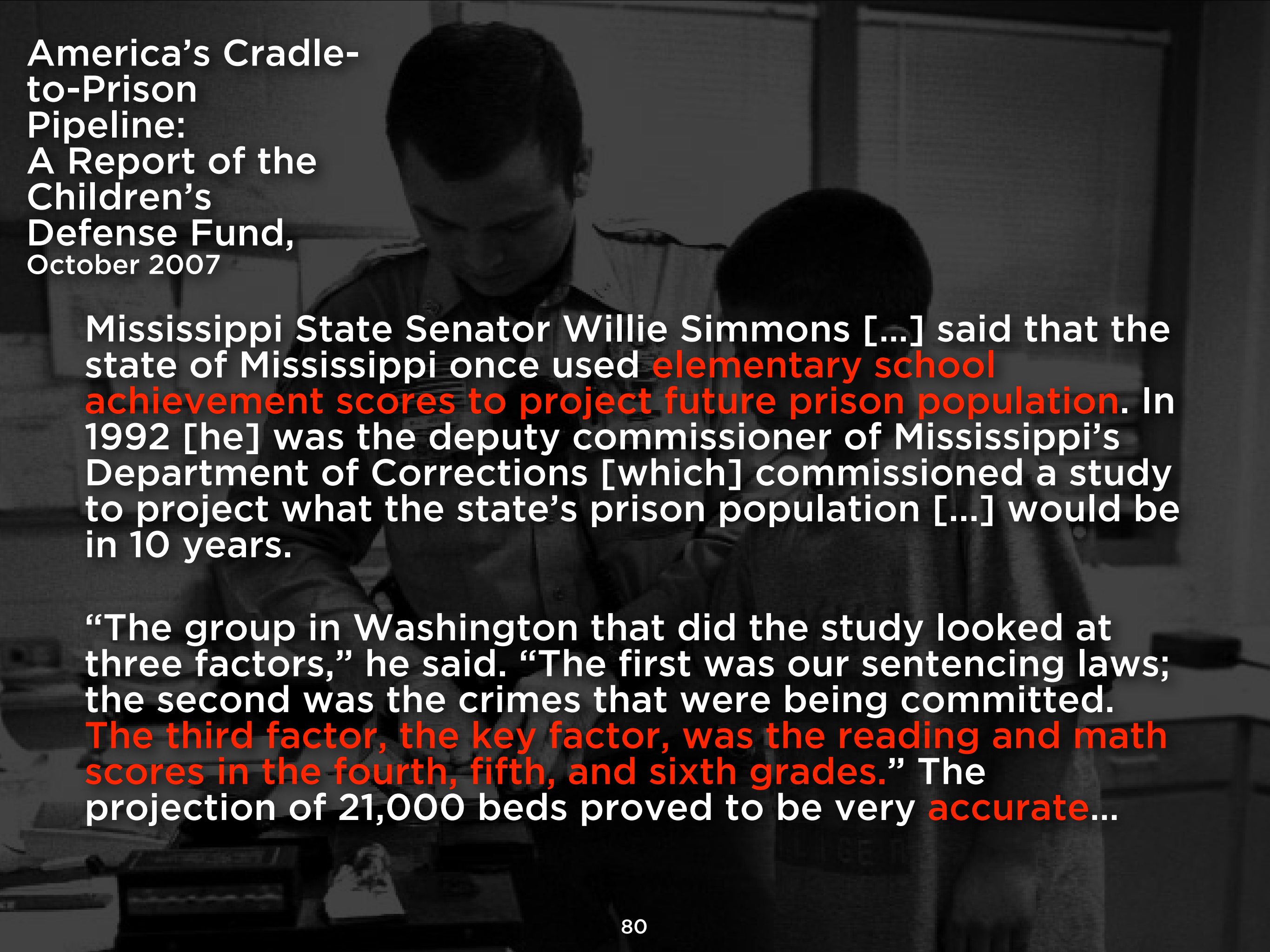
MIDDLE-INCOME CHILD'S LETTER RECOGNITION (22 LETTERS)

A B C D E F G H I

One-third
of children
enter school
unprepared
to learn.

Most ^(88%)
will **never**
catch up.



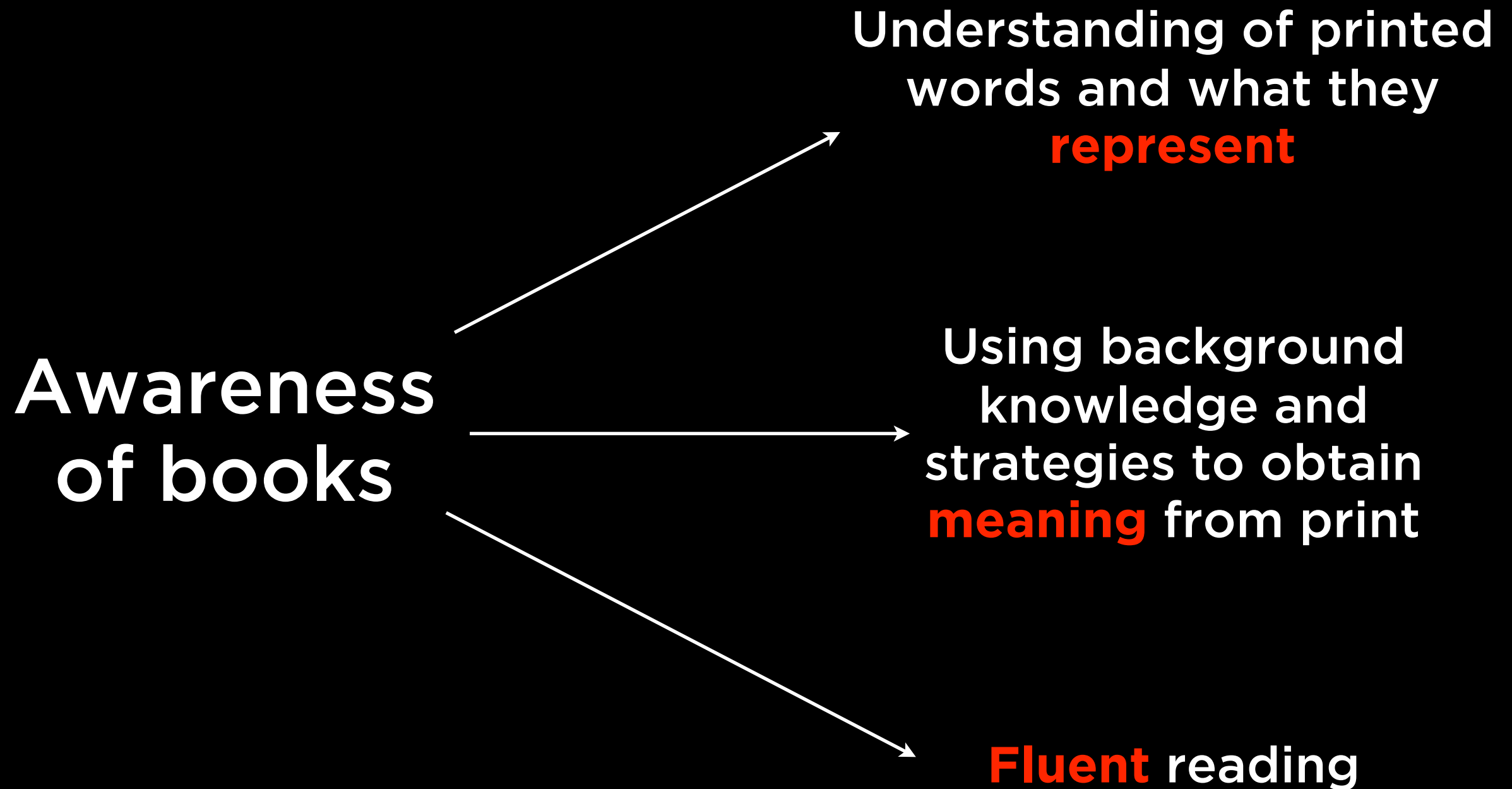
A man in a police uniform and a young boy looking at a book together.

America's Cradle-to-Prison Pipeline: A Report of the Children's Defense Fund, October 2007

Mississippi State Senator Willie Smith said that the state of Mississippi once used elementary school achievement scores to project future prison population. In 1992 [he] was the deputy commissioner of Mississippi's Department of Corrections [which] commissioned a study to project what the state's prison population [..] would be in 10 years.

Why Reading?

Reading is **the**
fundamental skill
for learning



Some people there are who, being grown, forget the horrible task of learning to read. It is perhaps the single greatest effort that the human undertakes, and he must do it as a child.

John Steinbeck

Emergent Literacy:

the early display of an awareness by children that **print conveys information**. It is an amalgamation of children's oral language development and their initial attempts at reading and writing. Such attempts include "reading" the pictures of a book, or scribbling. Emergent literacy, **if supported** by meaningful interaction in oral and written language, **evolves into full literacy** skills. (Teale & Sulzby, 1986)

Dialogic Reading:

The act of reading becomes a **conversation** between the adult and the child; the adult helps the child become the teller of the story by becoming the listener, questioner, and audience for the child.

Reading to children
may not be a natural skill for adults.

Reading at all may not
be something an adult is capable of.

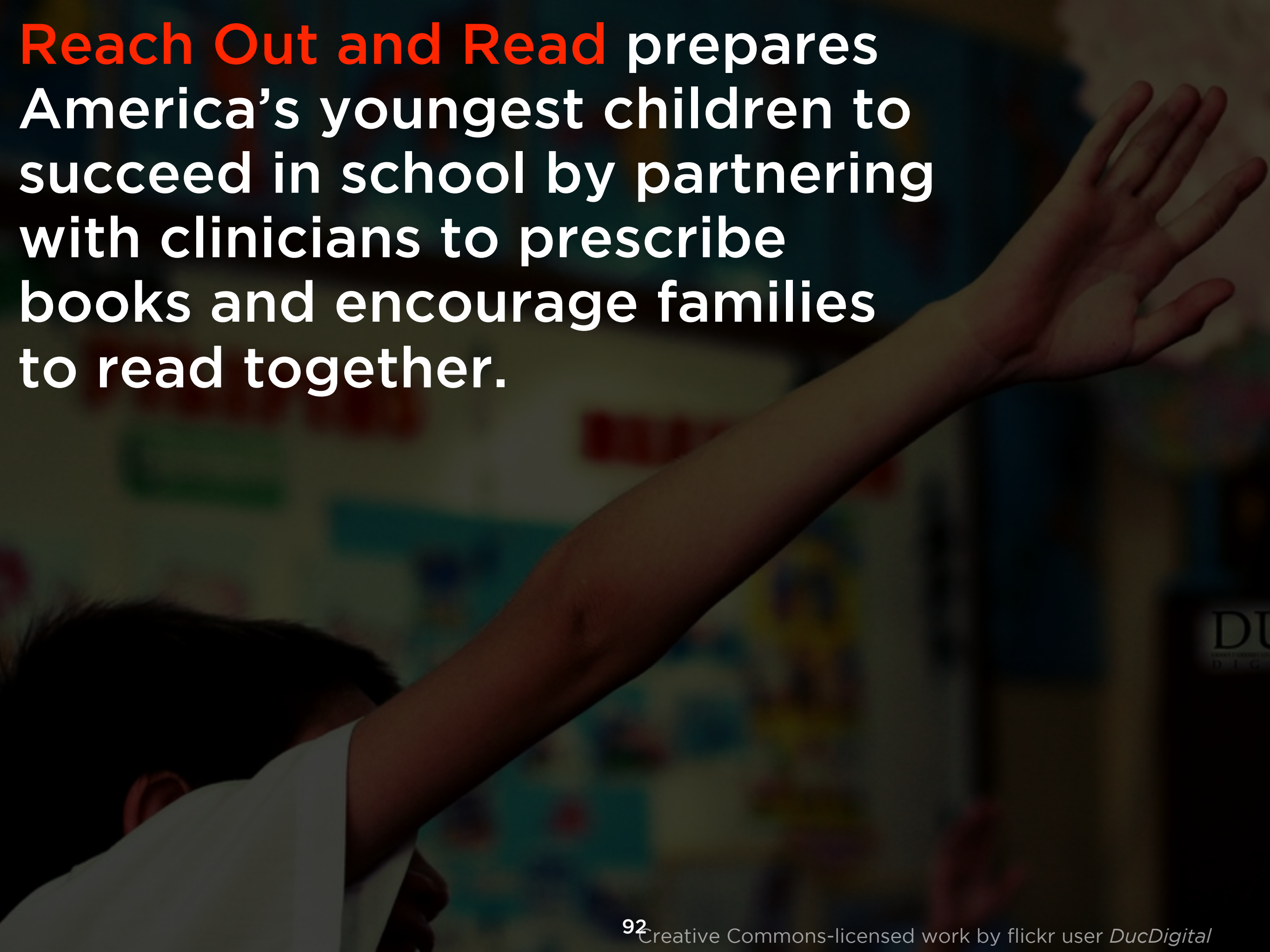
Reading problems may have
been an issue for generations.

Reading should be fun!

Part Three

Reach Out and Read



A child's arm is reaching upwards towards a wall covered in colorful alphabet letters. The text is overlaid on the top left of the image.

Reach Out and Read prepares
America's youngest children to
succeed in school by partnering
with clinicians to prescribe
books and encourage families
to read together.

In the exam room, health care providers trained in the developmental strategies of early literacy encourage parents to **read aloud** to their young children, and offer age-appropriate tips.

Prescription for Reading

Name: _____

Date: _____ Age: _____



Rx *Read Books*

- ☐ Every night at bedtime
- ☐ For _____ minutes every day
- ☐ As needed

Refills: as requested at local public library

Signature: _____

Dipesh Navsaria, MPH, MSLIS, MD

Pediatrician & Occasional Children's Librarian

Families: Please visit reading.pediatrics.wisc.edu for more information on the joy of sharing books together and how it can make a huge difference in your child's life.

of sharing books together and how it can make a huge difference in your child's life.
Families: Please visit reading.pediatrics.wisc.edu for more information on the joy

The primary care provider gives every child between the ages of 6 months and five years a new, developmentally-appropriate **children's book** to take home and keep.

"It is a great thing
to start life with a
small number of
really good books
which are your
very own."



- Sir Arthur Conan Doyle, 1908

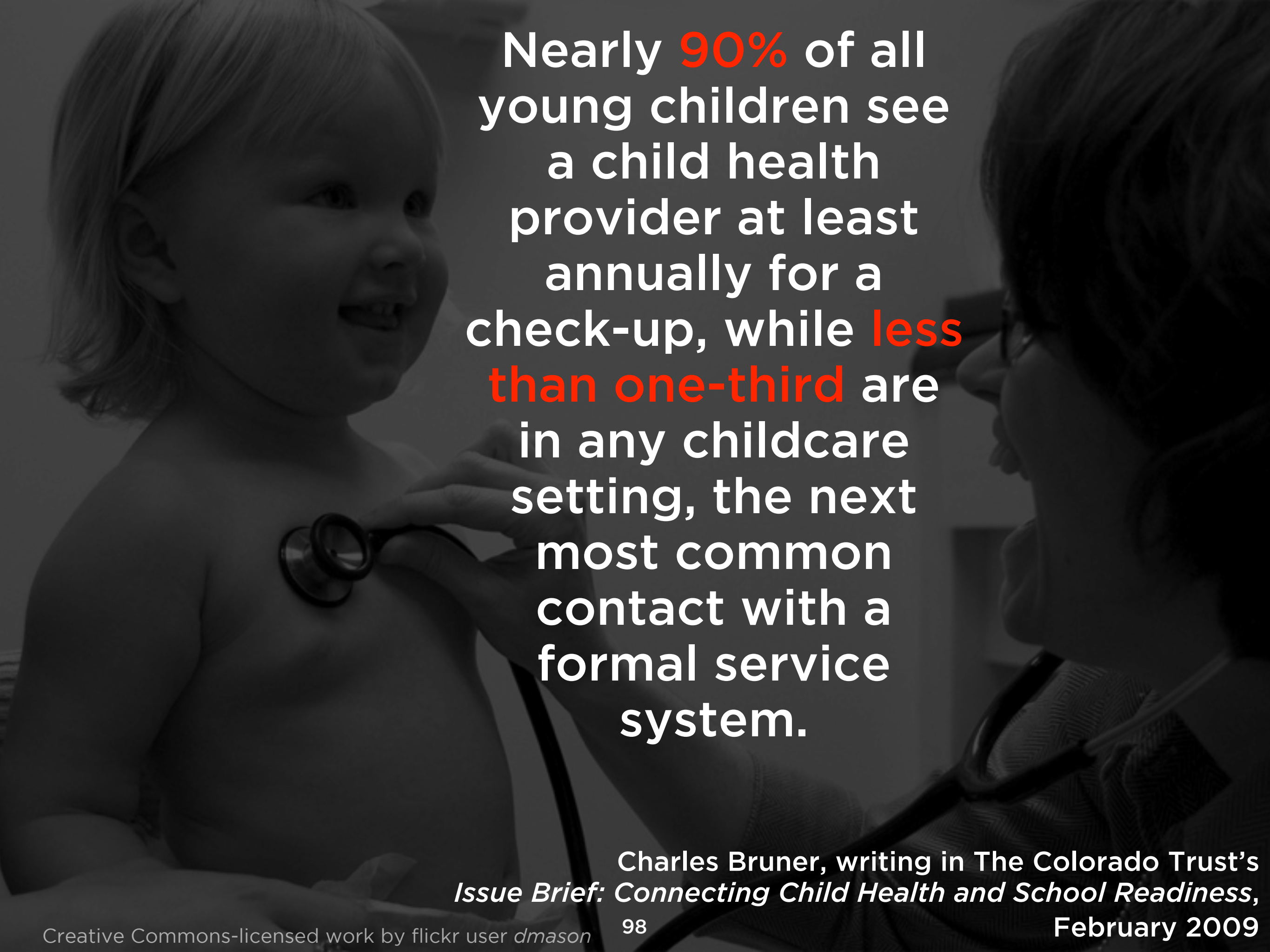
Three

Literacy-rich waiting rooms feature books, posters and reading nooks. Volunteers read aloud to children, showing parents and children the techniques and pleasures of looking at books together.

Our goal is **not** about

Teaching a child to actually read early

It is about learning to **love** books.



Nearly **90%** of all young children see a child health provider at least annually for a check-up, while **less than one-third** are in any childcare setting, the next most common contact with a formal service system.

Charles Bruner, writing in The Colorado Trust's
Issue Brief: Connecting Child Health and School Readiness,

Evidence

15 studies published in
peer-reviewed medical journals

ROR increases the likelihood that
children at-risk will be read to regularly.

ROR improves language scores
in young children at-risk.

ROR improves the home literacy environment.

There is **more** extensive published research
available supporting the ROR model than for **any**
other psychosocial intervention in general
pediatrics.

The British *Millennium Cohort Study*
Pediatrics, February 2010

12,500 children given vocabulary tests at age 5
Delays of almost a **year** in the poorest homes

“The research shows that a child who is read to every day at age 3 has a vocabulary at age 5 that is **1.92 months more advanced** than a child who has exactly the same observable characteristics (including income group), but who is not read to every day at age 3.”

“More affluent family circumstances are clearly associated with better parenting behaviours. At age 3, 78% of the richest children were **read to daily** and 91% had regular bedtimes, much higher than the corresponding numbers for the lowest income group.”

“Nevertheless, it is still the case that 45% and 70% of the lowest income parents practiced these beneficial behaviours, providing grounds for optimism that **good parenting can be adopted and extended in even the most disadvantaged families.**”

Parenting Behaviours, Perceptions, and Psychosocial Risk:
Impacts on Young Children's Development
Glascoe FP, Leew S. *Pediatrics*, January 2010
382 families assessed for child language development

“Of the families who seemed to be nonreaders or limited book readers, 21% had children at risk for developmental problems, compared with 12% of the families who were book readers...Families for whom book reading was uncommon were almost **twice as likely to have a child with delays.**”

“By 6 months of age, children whose parents **read aloud frequently outperformed children whose parents read rarely**; this pattern continued through 24 months of age.”

“Differences in communications skills increased with age, and the magnitude of the discrepancy between groups increased steadily with the age of the child.”

“Another critical focus for future studies is to operationalize parenting behaviors/perceptions into developmental promotion interventions that are **brief and workable in busy primary care settings**, following the example of effectiveness research established by the Reach Out and Read program.”

What we do

Reach Out and Read in the Exam Room

Videos courtesy of Reach Out and Read – Massachusetts

Nyla



12-15 months

Constant, happy babble:
exposed to language &
books

Calms and tunes to
Dad when she
reads

Child

Eagerly
explores book
with eyes/
hands/mouth

Holds book and turns
pages easily

What did we

see?

Allows Nyla
control of
book

Describes enjoyment of
quality time; notice joint
attention

Parent

Encouraged
not to give
up

Points to objects
to engage and
teach



nearly **5,000** sites nationally...

in all **50** states...

serving over **4 million** children...

via more than **28 thousand**
health care providers...

giving out over **6.5 million** books a year!

ADVICE FOR PARENTS

Read aloud together daily.

Have a bedside lamp for your child and allow reading time every night possible.

Limit screen time to less than two hours a day.

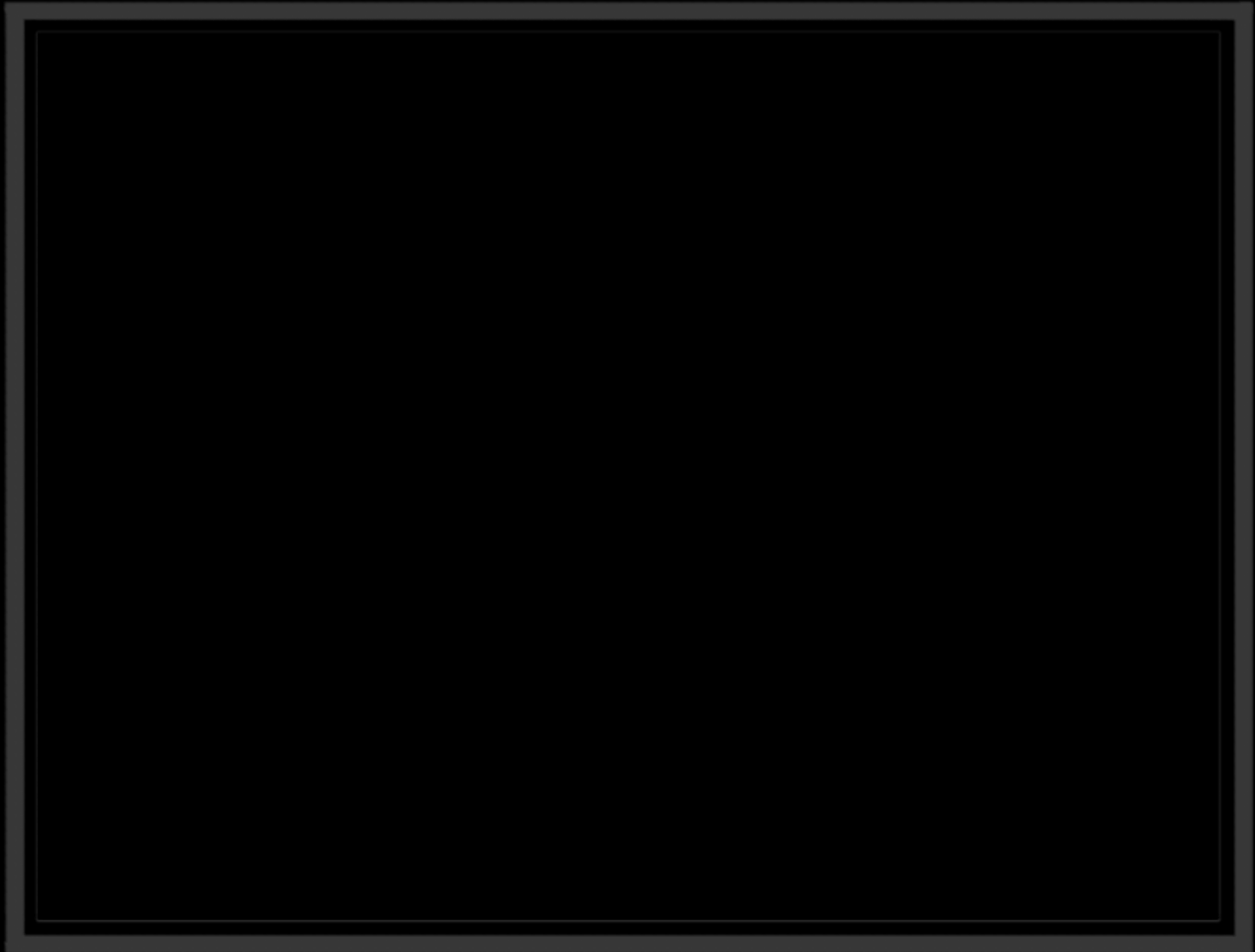
No TV, computers or video games in bedrooms.

Audio Books are fine.

Visit your school and public **libraries**.

Have reading be **fun**, not a chore.

Change the First Five Years and You Change Everything



Ounce of Prevention Fund

“While schools can do much to raise achievement among children who initially lag behind their peers, all too often pre-school gaps set in train a pattern of **ever increasing inequality** during school years and beyond.

Any drive to improve social mobility must begin with an effective strategy to **nurture the fledgling talent in young children** so often lost before it has had a chance to flourish.”

The Sutton Trust

facebook.com/DrLibrarian
twitter.com/navsaria
dnavsaria@pediatrics.wisc.edu

THE
END

